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WILDLIFE IN NORTH CAROLINA

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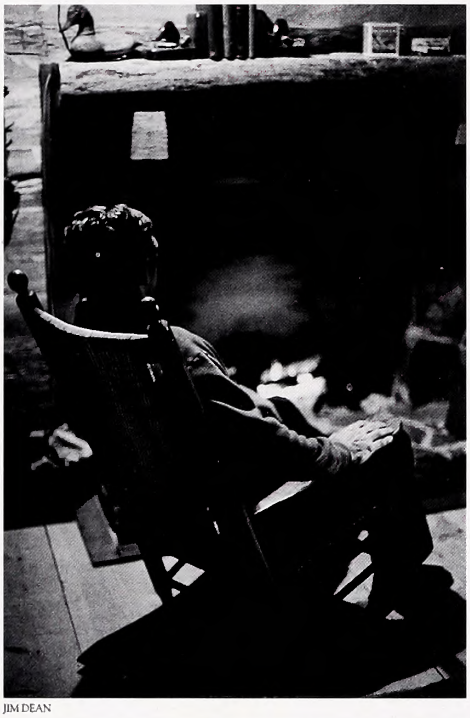
Quest for Fire

by Jim Dean ©2000



JIM DEAN

"It is a bit odd, isn't it, that fire remains such an enduring comfort even for those who no longer truly need it."

It was going to be just about right, I figured—overcast with the temperature falling into the low 40s that night, clearing in the morning. Not much wind. The wood stoves don't throw enough heat to keep bitter cold from penetrating the uninsulated clapboards on the three-room cabin at the farm, but they can keep things reasonably cozy in this weather and it seemed like a good time to spend the night. Mike met me there later in the afternoon, and he and I followed Meg for several hours. Just before sunset, we were only about 100 yards from the cabin when Meg wheeled to a stop in a strip of shrub lespedeza that runs through a waist-high field of broomstraw and weeds. She trailed the scent to the edge of the woods, then locked up in a classic point. The covey, about a dozen bobwhites, came up in twos and threes, buzzing low through the trees. My shot pruned the top of a pine, but drifting feathers marked Mike's shot, and Meg quickly fetched his bird.

It was too late to look for singles so we walked back to the cabin. "Meg's wet and muddy," Mike said. "So are we; bring her in," I said. I lit a couple of oil lamps, opened the doors on the Franklin stove in front of the sofa and stoked the fire I'd built several hours earlier. I had fired up the Home Comfort wood cook stove in the kitchen, and the old shower curtain I'd hung at the foot of the narrow stairway kept the heat from rising into the loft.

We sat for awhile, recounting that day, and others. By that time, Meg had cautiously inched her way across the floor, flowed onto the sofa like an octopus and was fast asleep in Mike's lap. Later, after they'd gone, I sat for a long time watching orange and blue flames lick the edges of split oak. I had brought a book, but it couldn't match that ageless fascination with flame. The next morning, with bright sunlight flooding the kitchen, I pulled a rocker beside the Home Comfort, propped my feet on the open door of the oven and drank a pot of coffee still perking gently over a firebox of glowing hickory.

It is a bit odd, isn't it, that fire remains such an enduring comfort even for those who no longer truly need it. Nowadays, modern furnaces heat most homes more efficiently, yet we still want fireplaces. If we don't have firewood, we use artificial logs, or gas-fired logs, and we often sit contentedly and watch them burn. It must be some ancestral thing, some deep-rooted instinct that can be traced to a time when fire in a cave offered warmth and protection, as well as a way to scorch the kill. Surely without it we would still be shivering in trees.

Some years ago, when 24-hour news, sports, weather, music, cartoon and food channels began to appear on television, I recall speculating that it would not be too long before we could surf to a continuous open fire channel. The programs would vary—an hour of split oak, followed by hickory or apple; an overnight fire of coal or peat, perhaps even a campfire with wieners roasting over it on coat hangers. Certainly there would be a seasonal Yule log featured for December. Of course that would only answer our visual needs, because there is also something special about the heat from such a fire. It warms the soul as well as the body, and we want a lot of it, pulling the chair close until our socks steam and our face is flushed.

Have you noticed that we will complain if the thermostat is set higher than about 78, but we'll sit happily in a room as hot as a nursing home if the heat is generated by fire we can see, or hear? After a day wading icy trout streams in late fall or early spring, my friends and I will return to the tiny mountain cabin and fire up an ancient cast-iron boxstove. Even a small kindling fire will soon have us sitting around in our underwear, but the moment that stove stops crackling, even if it's 90 degrees in the room, someone will throw in a couple more logs.

One cold winter day several years ago, I arrived to find all the firewood wet. Not only had I been looking forward to reading beside a fire, it was 20 degrees and I needed one. The can of charcoal lighter I usually relied upon—old Indian trick—was empty, so I tried without success to get a fire going with newspapers. Finally, in desperation, I poured a styrofoam cup full of white gas, set it under the wet logs and tossed in a match.

At last I had a fire, but it was weeks before my eyebrows grew back.

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Wildlife in North Carolina is the official educational publication of the North Carolina Wildlife Resources Commission. It is dedicated to the sound conservation of North Carolina's wildlife and other interrelated natural resources and also to the environment we share with them.

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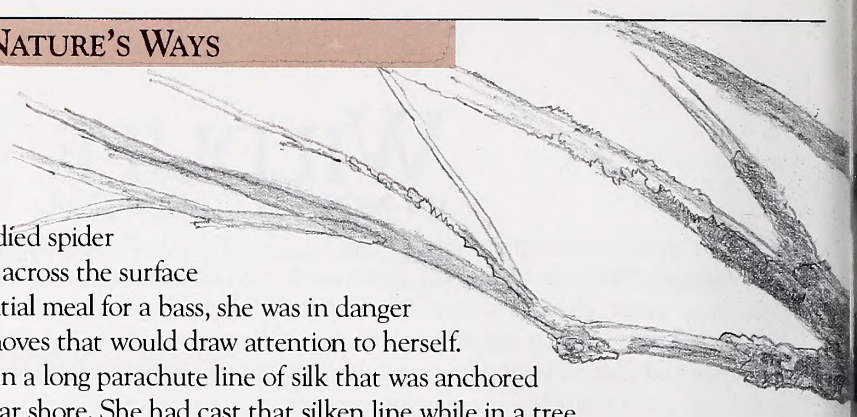
Cover *These down-covered baby owls huddle together in their nest inside a tree. Photograph by Derrick Hamrick* ©2000

Wildlife in North Carolina (ISSN 0043-549X) is published monthly by the North Carolina Wildlife Resources Commission, 512 N. Salisbury St., Raleigh, N.C. 27604-1188. Periodicals postage paid at Raleigh, N.C. and additional mailing offices. Subscription rates: one year $7.50, three years $20, lifetime $100. All foreign subscriptions are $23.50 per year. For subscriptions from foreign countries, payment **only** by U S Postal Service money order or cashier's check drawn on a U.S. bank. All orders must be prepaid. Please allow 6 to 8 weeks delivery on new subscriptions and address changes. **POSTMASTER:** Send address changes to Circulation Manager, 1711 Mail Service Center, Raleigh, N.C. 27699-1711. Address all correspondence regarding subscriptions to Circulation Manager. If you have a problem with your subscription, dial (919) 662-4377. Articles in *Wildlife in North Carolina* may represent the personal views of authors, and do not imply endorsement by the North Carolina Wildlife Resources Commission. *Wildlife in North Carolina* is available on audio cassette as a courtesy of volunteer services of the Department of Cultural Resources, Library for the Blind and Physically Handicapped, Raleigh, N.C., (919) 733-4376. **The N.C. Wildlife Resources Commission is an equal opportunity agency.**

Spider Weight

written by Roger A. Powell ©2000
illustrated by David Williams



A large, round-bodied spider glided smoothly across the surface of the lake. As a potential meal for a bass, she was in danger and made no erratic moves that would draw attention to herself. She moved by reeling in a long parachute line of silk that was anchored to a tall tree on the near shore. She had cast that silken line while in a tree on the far shore, and the line had risen on the soft breeze, sailed across the lake and hooked its anchor tree. Now she was reaching that tree, then teleporting herself out of the lake and up her silk line to safety from bass.

When this spider was much younger, and smaller and lighter, her options had been different simply because of her size. As a tiny, young spider, she would have tossed her silken line into the breeze and that line would have lifted her to the sky and carried her away. Now, as a large spider, her silken line can no longer lift her into the air. The line itself, however, can still float on the breeze, and she took advantage of that. This spider shows, in a small way, how gravity and air resistance affect animals of different size differently.

Animals that fly must also deal with gravity and air resistance. A big wing meets more resistance from air when flapped than a small wing does and, therefore, can lift a bigger animal. Progressively larger animals, however, need disproportionately larger wings to fly. A spiderling is so small that it can be lifted by a thread of silk. Large insects are easily lifted with small wings. The wings of small birds and bats are relatively larger than those of insects, and large birds, like eagles and vultures, have disproportionately bigger wings yet. Eagles and vultures are so big, in fact, that they glide on rising warm air as much as possible. Flapping their wings to lift themselves is hard work.

Had our spider dropped to the ground, she would have landed safely because the resistance of air to her fall would nearly have matched the pull of gravity. Even a mouse can fall from a tree without fear, and when a wood duckling jumps from its nest hole high in a tree, it bounces when it lands, gives itself a shake and trots away after its mother. On the other hand, a squirrel is big enough to be killed by a fall from a power line to the road below.

Air resistance brakes the fall of the little creatures because it's proportional to the area of the surface presented to the air. It doesn't cushion the squirrel's fall because gravity's pull is proportional to an animal's weight. Since big animals have less surface area relative to weight, they feel less resistance from air when they fall.

Yet dropping to the water presented our spider with a potential danger even greater than gravity: surface tension. Surface tension is a property of water that acts like a thin membrane which can support very small creatures, or even trap them if they are submerged. If you dropped into the lake, surface tension wouldn't prevent you from getting out. You'd carry a thin film of water on your skin, about a twentieth of a centimeter in thickness, weighing roughly half a kilogram, or about a pound. No problem. But when a mouse hauls itself from the water, it carries its own weight in water and it struggles to escape. And if our spider had gotten wet, she would have carried many times her own weight in water and would not have been able to lift herself on her silken thread.

But when she fell onto the lake, she did not splash nor did she go under the water. Instead, surface tension held her on top of the water, and she climbed her silken lifeline to break the surface tension and extract herself from its grip.

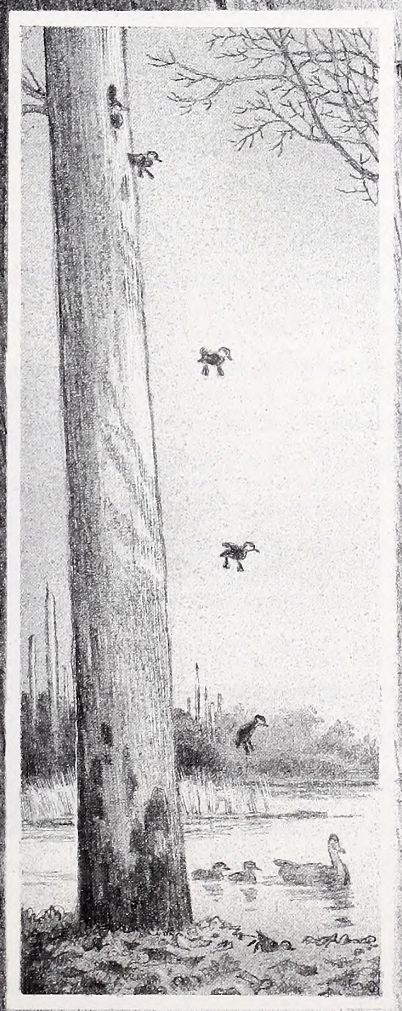
Our spider has fallen from a tree and not been hurt, she has floated when she could not fly and she has escaped the clutches of surface tension, all because of her size. She has had a good day.

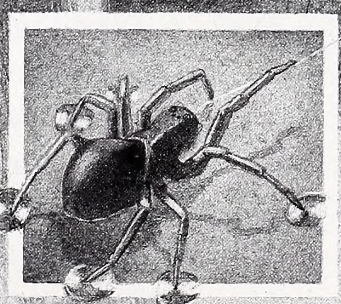
Other Reading

- Martin, Patricia A. Fink, *Animals That Walk on Water* (Watts Franklin, 1998).
- Vogel, Steven, *Life's Devices: The Physical World of Animals and Plants* (Princeton, 1989).

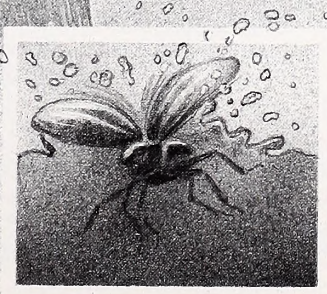
Roger A. Powell is professor of zoology at North Carolina State University

A day-old duckling *jumps from its nest cavity to the pond surface, its stubby wings helping to brake its fall. Though falling a great distance to join its mother and siblings (below, left), the fragile duckling risks no injury when it lands because the pull of gravity on its feather weight is offset by the resistance the air offers to its body.*





When it splashed into the pond, *the heavy-bodied winged bug (below) broke through the water's surface tension. Carrying several times its own weight in water, it now struggles fruitlessly to escape. The lighter spider (above) doesn't break through the water's surface tension but is supported by it. It transports itself to safety by climbing a silken thread that is attached to a tree on the other side of the pond.*



Conservationist at the Helm

Long-time environmental lobbyist **Bill Holman** took over the Department of Environment and Natural Resources just days before *back-to-back* **hurricanes** battered eastern North Carolina.

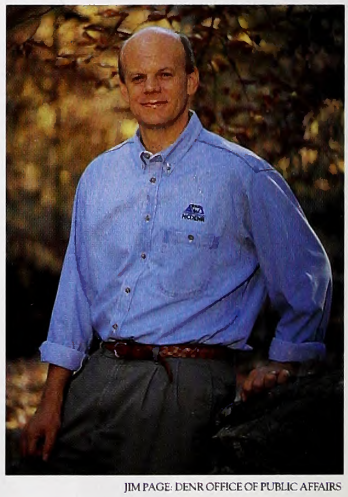
He **hasn't stopped** running since.

interview by Lawrence S. Earley

The new secretary of the state's Department of Environment and Natural Resources, Bill Holman, is being determinedly optimistic these days, despite the events of his first weeks in office. The worst environmental catastrophe in state history has consumed him, leaving precious little time to tackle the ambitious agenda he set forth in his acceptance speech in early September.

"One of these days, I'll have to dust off that speech I gave at the swearing in," he says with a grim laugh. "I'm a little behind at implementing a lot of that stuff."

To be actually driving the state's environmental agenda is an interesting turnabout for the former lobbyist. For 20 years, Holman represented the Conservation Council of North Carolina, the Sierra Club and other environmental organizations to the state legislature, lobbying on behalf of numerous conservation laws. Despite his environmental advocacy, however, Holman was respected by political friends and foes alike because of his unconfrontational manner and ability to work out compromises. From 1985 to 1997, he was rated by legislators, lobbyists and reporters as among the 10 most effective lobbyists in the General Assembly.



JIM PAGE: DENR OFFICE OF PUBLIC AFFAIRS

For some, the appointment of someone with Holman's background as the state's top environmental official was long overdue. Now conservationists are waiting to see whether he is as effective in his new position as he was as an environmental lobbyist. In November, *Wildlife in North Carolina* was able to grab an hour with the busy secretary to learn what issues he had on his agenda as the new century begins.

WILDLIFE IN NORTH CAROLINA What are North Carolina's critical environmental issues?

BILL HOLMAN One of Gov. Hunt's and the department's main priorities is to continue our efforts to reduce water pollution, particularly in the Neuse, Tar-Pamlico, the Catawba and the Cape Fear river basin. We've drafted comprehensive basinwide management plans for these four rivers with the Environmental Management Commission and with extensive public participation. We're going to reduce pollution from municipal wastewater treatment plants and industries, as well as reduce pollution from urban storm water and agricultural run off. And we've got to protect and restore wetlands and buffers if we're going to clean up our rivers.

Another big issue for next year and next century is efforts to reduce air pollution. The 1999 General Assembly passed a clean air bill that will reduce emissions from cars and trucks. Gov. Hunt has directed DENR to develop a plan and rules to reduce emissions from power plants. We have a serious ozone problem in the urban areas. We also have serious problems in the mountains where air pollution is elevating levels of ozone, decreasing visibility, and in general affecting the health of the mountain forests. Our urban ozone problem in the state is pretty much a problem we create by ourselves, with some contribution from South Carolina, and we have a responsibility to solve our problem. Cleaning up the air in our mountains will require regional cooperation with upwind states.

WINC Recently an environmental group in the mountains, using data from the National Park Service, rated the Great Smoky Mountains National Park as having the worst air pollution of any national park. What can the state do to alleviate this situation?

HOLMAN First, the state has to reduce its own air pollution. We are working hard on that. Second, we must work with other states to reduce their pollution. North Carolina is a member of the Southern Appalachian Mountain Initiative (SAMI). Gov. Hunt convened the first Governors' Summit on Mountain Air Quality in Asheville in April of last year. Eight states participated. Georgia Gov. Roy Barnes will sponsor the summit next year. And Gov. Hunt continues to push for regional solutions for clear air in the Southern Governors Association.

One thing about environmental problems is, even when you have success, you've got to be vigilant. We saved the Great Smoky Mountains back in the 1930s, right? But now there are some days when you shouldn't hike because the air is so polluted. So even when you buy a piece of land, you've got to manage it so it's protected. Even a park that size is not an island.

WINC You've mentioned two big initiatives—improving water quality and air quality. Any others?

HOLMAN Gov. Hunt has set a goal of conserving an additional 1 million acres of land over the next 10 years. North Carolina is growing so rapidly that the governor understands that if we don't take steps soon, many recreational areas and prime pieces of farmland will be gone. We need to expand our state parks and game lands. We also need to increase private conservation efforts, farmland preservation and forestland preservation. It includes work by local land trusts.

It's a very exciting goal. Our department has just begun to develop a plan to achieve it.

WINC A couple of questions about Hurricane Floyd, while it's fresh in your mind.

HOLMAN It'll be fresh in my mind next year too.

WINC The big debate right now is whether hog lagoons that were inundated during the floods and that contributed to pollution should be rebuilt in 100-year floodplains or not. What's the state's policy now and will it change in coming months?

HOLMAN I think the state's policy on rebuilding is pretty clear. Animal waste lagoons should not be rebuilt in the 100-year floodplain. The General Assembly in 1997 banned new lagoons from the 100-year floodplain. So our law is pretty clear.

What's not so clear is the question of repairs. The general rule of thumb—where you draw the line between what's a repair and what's a rebuild—is, if the structure is over 50 percent damaged, it's a rebuild, and you have to rebuild to current standards. Current standards say you can't rebuild in the flood plain. If it's less than 50 percent damaged, then you can repair. Using that principle, it means that most if not all of the 50 lagoons that were flooded could be repaired. Gov. Hunt and our department want to move animal waste lagoons, wastewater treatment plants, junkyards, homes and other uses out of harm's way, out of the 100-year floodplain.

In line with that goal, the state in November committed to spending $5.7 million from the Clean Water Management Trust Fund to buy out as many as 15 hog farms located in the floodplain. The state wouldn't actually buy the land, but purchase conservation easements which would prohibit the location of hog farms. But the effect would be to remove the hog operations while keeping the land in agricultural use. Kinston wants to move its wastewater treatment plant out of the floodplain and we're working with them on that. It's an issue of getting the engineering done and finding the money. It will take several years to make it happen, but there is a clear commitment by the city and state to make it happen. We need to get risky activities out of the 100-year floodplain; it's just asking for trouble to leave waste treatment facilities there.

WINC We'd like to get your opinion on several other issues. First of all, we're hearing a lot about "smart growth" these days. Some skeptics think it's an oxymoron, like "jumbo shrimp." What do you think?

HOLMAN I don't think it's an oxymoron. DENR has a modest role so far in smart growth. The General Assembly has provided incentives for local and regional planning in the allocation of clean water grants and loans. Competition for water and wastewater money is intense enough that we're beginning to see some

changes in behavior among the local governments applying for those funds. For example, in the most recent grant cycle last July, the folks who did best were doing regional projects or who had adopted land-use planning and land-use regulation. That's not smart growth per se, but it shows that the state is more likely to give funds to communities with land-use planning who are prepared to manage their growth, and that will begin to reward communities doing the right thing.

I think the flooding from Floyd has made the cost of dumb growth clearer.

WINC Aquifers. The Castle Hayne aquifer and others down east are running out of water. What is the department doing about this?

HOLMAN We'll have to look at some kind of a cap-and-reduce strategy in the central Coastal Plain because they're withdrawing water faster than it's being recharged. The Environmental Management Commission is in the rule-making proceeding to expand what's called a "capacity use area" in most of the central Coastal Plain, and it's working on a plan to manage water use in that region to get us to a sustainable point. Local governments and industries in that area will take a look at several aquifers there and look at water conservation, efficiency and reuse and look at sources of surface water as well.

It's a sustainable development issue in a really concrete way. We can't keep wasting resources like we've been. Water's a very precious resource. We've always had abundant water in North Carolina and never had to worry about water use. We're beginning to see shortages in the central Coastal Plain, in Cary, Apex, Jordan Lake and Greensboro. It's just the beginning. One of my predictions for the next century is that water will become more valuable, and competition for it will become more fierce. But also we won't waste as much of it.

INCREASING AIR POLLUTION IS AFFECTING THE HEALTH OF FORESTS AND ELEVATING OZONE LEVELS IN THE STATE, ESPECIALLY IN THE MOUNTAINS WHERE VISIBILITY HAS NOTICEABLY DETERIORATED. THE GREAT SMOKY MOUNTAINS NATIONAL PARK WAS RECENTLY RATED AS HAVING THE WORST AIR OF ALL NATIONAL PARKS.

KEN TAYLOR

WINC Chip mills. In western North Carolina, a lot of people are upset about the clear-cutting in hardwood forests that is feeding enormous amounts of timber to chip mills. The state is partnering with Duke University and N.C. State University in a study of chip mills and their economic and environmental effects. What's the likely result of their study?

HOLMAN Gov. Hunt directed DENR to study the environmental and economic costs and benefits of chip mills. The results of the study are due in March 2000. I think the chip mill debate is part of a debate about sustainable forestry, just like sustainable water. Like water, forests are a finite, sustainable resource. The economic and environmental values of forests are increasing. Chip mills or no, forest land is being converted to urban uses. There's increasing pressure on forests to provide us with benefits such as clean water, wildlife habitat, open spaces and fiber. The debate about a declining amount of forest land will get more attention.

We will need to move toward sustainable forest management. There are two lines to watch: one is, are we cutting the trees faster than we're growing? The other line is harder to gauge—are we changing the diversity of the forest?

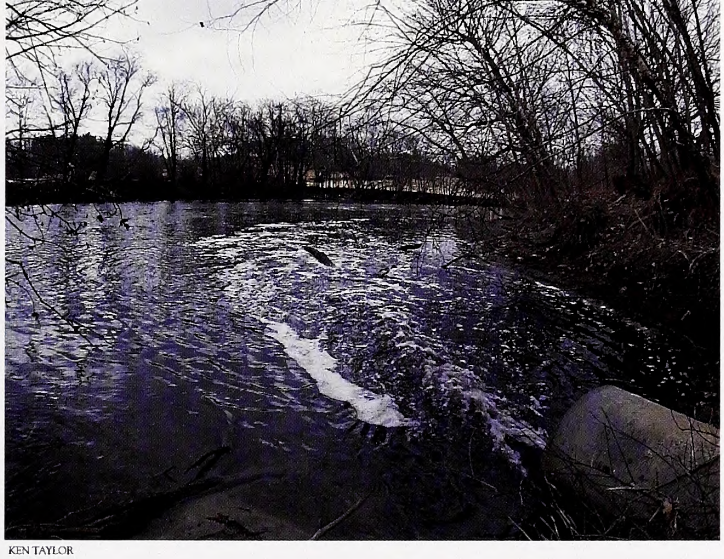
Industry has a huge stake in this issue as well because they've made major investments in saw mills, local paper mills and furniture mills.

WINC Marine Fisheries: Will there be a saltwater fishing license this year?

HOLMAN I hope there will be one, if not this year then next year. Yes, there will be a saltwater fishing license. The hunting and fishing licenses that support the N.C. Wildlife Resources Commission have been successful in restoring game and fish across the state. We need a similar effort for our marine fisheries. I don't know where else to get the money. I'm looking forward to buying one...and hope to get to use it.

WINC You've been fighting for a better environment in North Carolina almost as long as the environmental movement has existed. Are we any better off now than we were in 1971?

HOLMAN We've improved in

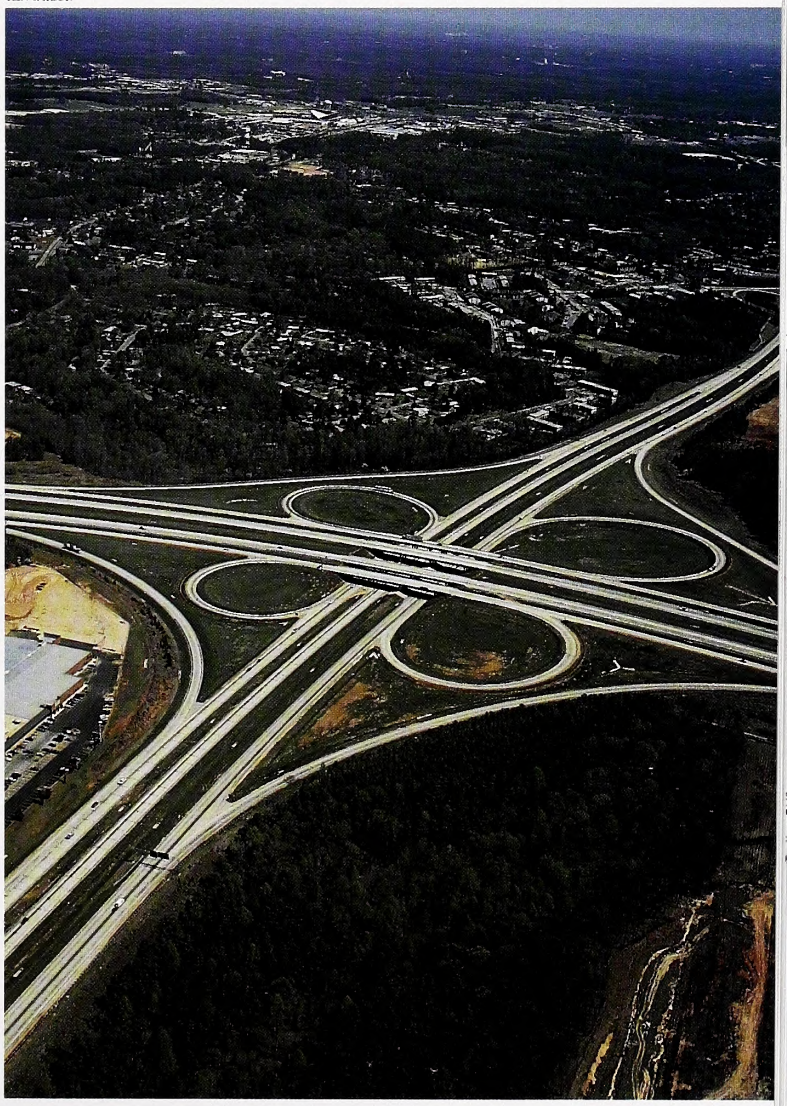


KEN TAYLOR

WATER POLLUTION CONTINUES TO PLAGUE COMMUNITIES THROUGHOUT THE STATE (ABOVE), AND ADVOCATES OF SMART GROWTH ARE PRESSING THE STATE'S ENVIRONMENTAL AGENCY TO HELP CURTAIL SPRAWL (BELOW).

some ways and in others, lost ground. Some things have gotten better. We should celebrate those successes and challenge ourselves to do more. Wastewater treatment plants are doing a much better job treating industrial waste than 30 years ago. Of course there's 3 million more people here than there were in 1970, maybe more. Think about cars: cars are probably 10 or 20 times cleaner today than they were 30 years ago. But there are lot more of them, and we're driving them a lot farther. We've phased out some chemicals: phosphate laundry detergents, some persistent pesticides. We've banned some dumb things like putting hazardous waste in open lagoons that leak. We don't do that any more. We have great efforts to acquire lands through the Clean Water Management Trust, Parks and Recreation Trust and the Natural Heritage Trust funds. We're trying to protect and restore wetlands and buffers. It's a moving target, though, because of our population growth. Essentially we have to run hard just to maintain a good quality of life.

KEN TAYLOR



WINC Any areas in which we've fallen behind?

HOLMAN Our biggest challenge is managing the way we grow. We're very wasteful of our land. We cannot maintain clean air and clean water, adequate open space and recreation, farm and forest land without smarter growth.

WINC When you were an environmental lobbyist, you could afford to pursue environmental goals a lot more single-mindedly. But now that you're in state government, you're probably a lot more aware of politics and economics. Has that been a frustration to you?

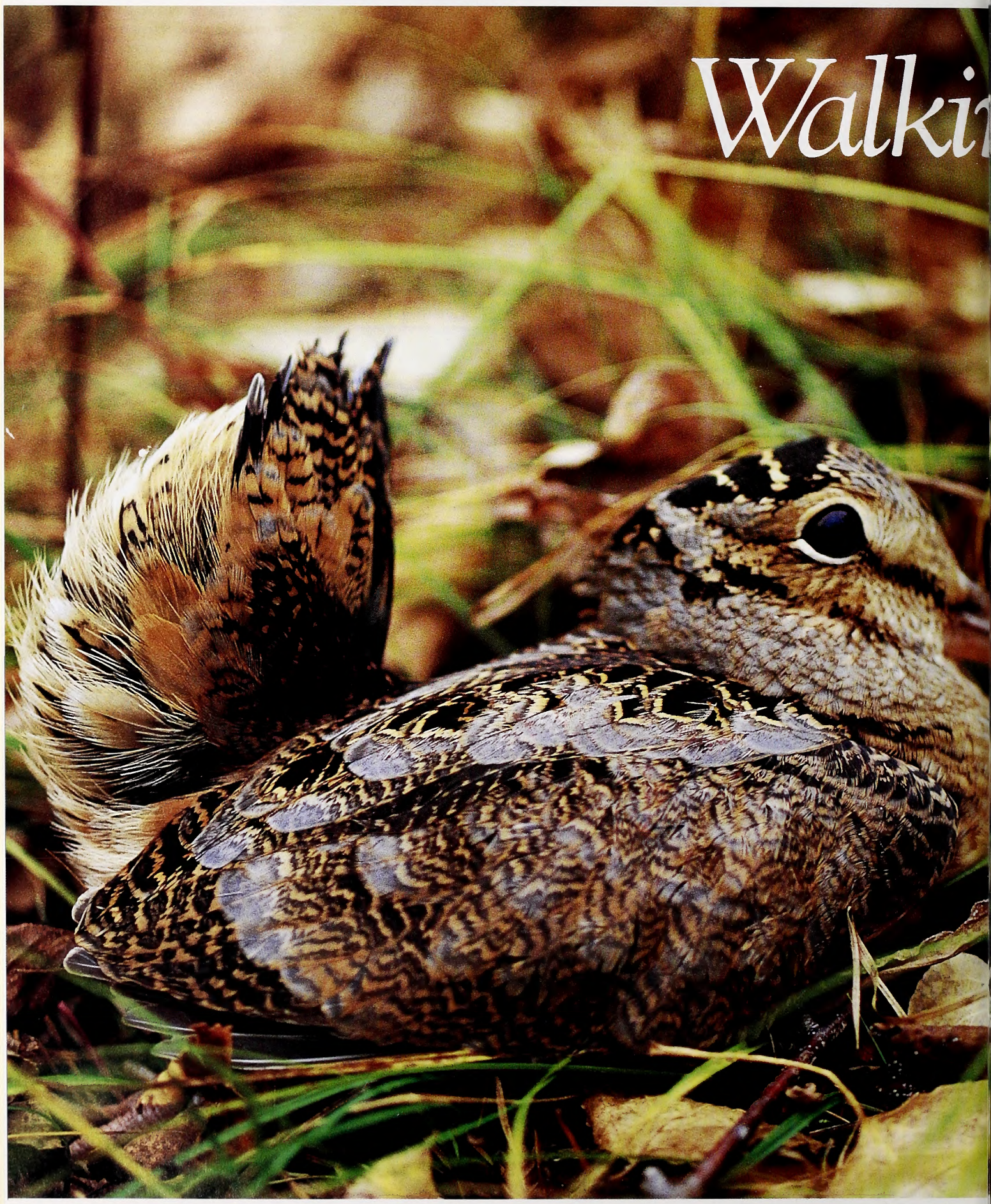
HOLMAN I have a lot more respect for what state agencies have to do to implement environmental laws. I spent the first 20 years of my career working with the legislature to pass stronger environmental laws, and now my job is to implement those laws. As hard as it is to pass laws, it's even harder to implement them because it takes human beings to make inspections, give technical assistance, take phone calls from angry citizens, etc.

Passing a law doesn't change anything. Implementing the law is what protects public health and the environment and what brings about change. Even though it's a harder task, it's an important one.

WINC Is that one of the challenges you face that drew you into the public arena?

HOLMAN Yes. Gov. Hunt gave me an opportunity to help carry out his environmental agenda, including enforcement of some of the environmental laws I helped pass. And I'm very much excited about that opportunity.

The frustrations are worth it because I feel like I'm making a difference. It's an exciting time to be at DENR. There's tremendous public support for clean air, clean water and open space protection. Gov. Hunt is providing strong leadership on these issues. I'm glad to be here despite the headaches. ⊠



Walki

DENVER BRYAN

g-Up Woodcock

In marshy thickets throughout the state, timberdoodles offer good winter sport to hunters—whether they have a dog or not.

written by Gerald A. Almy ©2000

DENVER BRYAN

***Though not nearly** as popular as quail, woodcock (facing page) do provide hunters with exciting wing shooting during the colder months. Woodcock, also known as timberdoodles, can be located in thick cover along streams or low-lying areas, predominantly in the Piedmont and Coastal Plain.*

My introduction to woodcock hunting was a fumbling affair fraught with bloodied knuckles, sore legs, wet feet and empty game bags. It's not surprising that baptism into this sport was such an ordeal. Things often go that way when you try to teach yourself how to hunt a new species from scratch, with no mentor to lead the way.

That's exactly what I did when I started hunting woodcock, because there weren't many woodcock hunters in my area 25 years ago. Precious few, anyway. Most southerners didn't know a woodcock from a woodchuck. Those who did typically mislabeled them "snipe" and bagged them incidentally while hunting quail. Actually, it's not hard to understand why woodcock were so neglected back then. Wild bobwhite quail were still available in good numbers. When you could go out and bust up four or five coveys of quail in a morning, who would want to snoop around in marshy thickets searching for a transient tan-and-black bird with a Pinocchio beak?

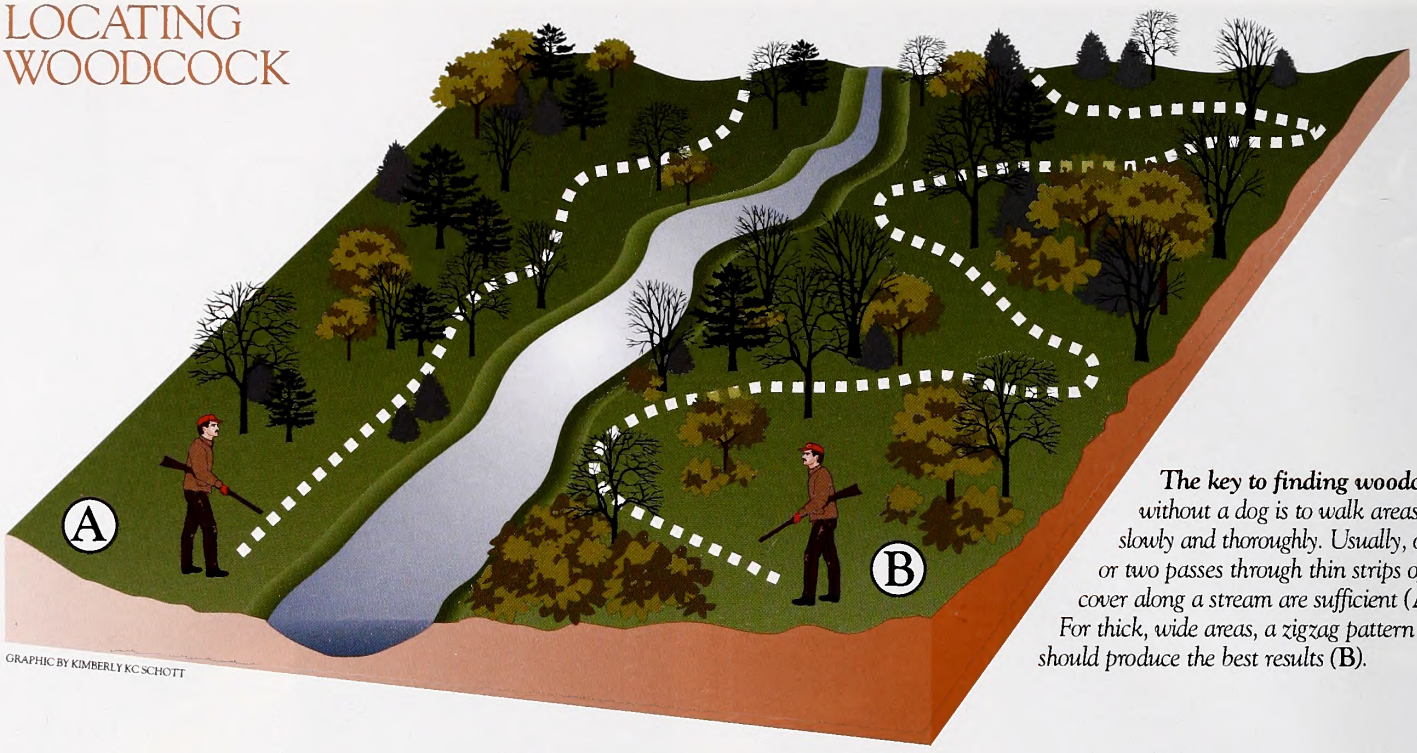
Well, one fool anyway. So, drawing from a sketchy background gleaned from books about New England shooting, I struck out with my 16-gauge side-by-side and a pocket full of No. 8s.

Finding those first birds took more than a pittance of dues paying—stumbling through honeysuckle and birch thickets, stepping into bog holes just deeper than my boots, getting scratched in brier patches. There were times when I despaired of *ever* locating a woodcock, and times when I wondered whether I should've stuck with quail, rabbits and squirrels.

But it was on one such occasion, as I paused to reflect on my poor luck, that Mr. Woodcock appeared, flushing suddenly into the blue December sky. It had launched itself from just 10 feet away. But as the mottled bird climbed on whistling wings, swerved through the branches and disappeared above the sapling growth, I realized I hadn't even raised the gun, so captivated was I with the sight and sound of my first woodcock flush.

Remembering why I was there, I plodded after the bird and flushed it again, dropping the quarry cleanly

LOCATING WOODCOCK



GRAPHIC BY KIMBERLY KC SCHOTT

***The key to finding woodcock** without a dog is to walk areas slowly and thoroughly. Usually, one or two passes through thin strips of cover along a stream are sufficient* (**A**). *For thick, wide areas, a zigzag pattern should produce the best results* (**B**).

with my second barrel. At last, I was a woodcock hunter. Moving through the stream bottom cover, I flushed two more birds before heading home, bagging a larger female to accompany the male already in the game pouch. In the process, I became totally hooked on this long-beaked quarry.

Since that initial encounter two and a half decades ago, woodcock hunting has been an abiding passion of mine. I've learned that by concentrating on exactly the right habitat and using some special tactics, excellent shooting can be experienced without the aid of dogs. This doesn't mean dogs aren't a joy to hunt woodcock behind. They definitely are. If you have access to a dog trained on this bird, it can enrich the hunt greatly. But if you or your hunting friends don't have a skilled woodcock dog, excellent sport can still be enjoyed jump-shooting this delightful quarry of the stream bottoms.

North Carolina woodcock hunters number about 3,000, but there are enough birds and habitat for many more sportsmen to enjoy this intriguing game species. Woodcock hunting is done throughout the state, but a greater percentage of it takes place in the Piedmont and Coastal Plain than the Mountains, especially during the latter part of the season.

A few woodcock reside year-round in North Carolina, but the majority migrate to northern states and Canada to breed during spring. In the fall, when cold temperatures freeze the ground, preventing easy access to earthworms, the birds begin migrating south, with a large number passing through North Carolina, headed eventually to the Gulf states. During mild winters, some woodcock get as far as North Carolina and cut their migration short, staying put until they head back north in the spring.

Look for fresh concentrations of migrating birds after a cold northwester blows in. As a rule, hunting in the mountainous part of the state is best early in the season, with Coastal and Piedmont areas following soon after.

The woodcock (*Scolopax minor*) was once a bird of the seashore. Over the centuries, it has gradually shifted to moist, brushy thickets bordering streams, swamps, cypress ponds, spring seeps and beaver ponds, where it finds abundant supplies of earthworms to satisfy its enormous appetite. Woodcock use sensitive nerve endings in their bills to locate earthworms and extract them from the soil. They can eat up to their own weight —7 ounces—in worms in one night.

While it's true that woodcock range up hillsides at times, they are more scattered in such cover and best hunted there with dogs. Most of the time, the birds will be found along stream bottoms, seeps and edges of swamps. This is where they're concentrated most heavily.

But moist ground is only part of the equation. The habitat must also feature the right kind of vegetation. Areas with young, low trees about 8 to 15 feet tall are preferred. Favorable tree and plant species include small maples, dogwood, willow, ash, holly, blackberry, sumac, clumps of pines, plum thickets, lespedeza and thickets of honeysuckle.

Once you locate an area with moist soil and low tree growth, two types of sign will help you determine whether birds are actually using the cover: pencil-sized holes where the woodcock have probed with their beaks, and chalky white droppings called "splashings." The beak holes can be difficult to see, but the white liquid droppings, about the size of a half dollar, stand out vividly against the leaf litter, grass and dark soil along creek bottoms.

If the splashings are dried up and turning yellow, it's likely the woodcock that left them have already passed through. But don't give up on the area; other birds may still filter in, sometimes over a period of a month or more. If the splashings are wet and fresh, get ready. Woodcock are in the area, and a flush could come at any moment.

Once you've found prime woodcock cover along spring seeps or stream bottoms and sign tells you that birds are in the area, the key to flushing them without a dog is to work the area slowly and thoroughly. I use three approaches for probing woodcock cover, depending on how wide the area is. If the prime vegetation and moist ground take up only a narrow strip along the stream —perhaps 15 yards or less on each side— generally one walk through the cover on each side will flush most birds present.

For wider strips of habitat, make two passes on each side. Start out working a course near the edge of the creek, then swing back down and hunt a parallel route 20 to 30 yards away from the water, covering the ground you missed on the initial pass.

Then move to the other side of the creek and repeat the coverage. Birds flushed right along the water that you don't bag on your initial sweep will tend to fly farther away from the creek, so you can often locate them again on the second pass along the cover's outer edge. (If you see where they land, however, you may prefer to go after them immediately and try to reflush them.)

A third situation involves a large spread of woodcock cover along a swamp or beaver pond, where the damp, rich soil and low trees extend for 50 yards or more on either side. These are the most difficult coverts to probe thoroughly, but they offer a lot of habitat and can hold heavy concentrations of woodcock, making them well worth the extra energy and time required to hunt them effectively.

Two hunters can work these larger areas best. But whether you have a friend along or not, the best approach is to zigzag through the prime area on each side of the water. Of course, how thoroughly you probe the area depends on whether you're seeing sign and flushing birds.

A nice thing about woodcock hunting is that once you locate game, chances are good you can expect to find birds there at a similar date in future years, unless the habitat changes significantly. Once you get a half dozen or so good spots located, then you can simply move from one to the next until you find an area that's holding birds. Once you do, a covert or two is usually all that is required to bag a limit of three "timberdoodles," as these birds are sometimes called.

It also pays to hunt slowly and pause often. Woodcock will often hunker down instead of flushing when they hear a person walking. If you keep walking, you'll never know they were there. However, if you pause, the sudden halt makes the bird think a predator has seen it and it must fly away.

I would estimate that well over half of all the woodcock I flush when hunting without a dog come when I have stopped my forward progress. Not only does this strategy flush birds, it moves them when you're ready for them—when you've stopped in a fairly open spot where you can raise the gun and swing freely as the woodcock twitters out of the brush.

A pause of 10 to 20 seconds is usually adequate, but sometimes I've waited a minute or more and had birds fly out literally at my feet. I might stop every 40 or 50 feet in prime cover. Other times, I might walk 100 feet or more between pauses.

When woodcock flush while you're hunting without a dog, they may be quite close. I favor a gun barrel with an open-choke or, at most, an improved cylinder. You can use a 12-, 16-, 20- or 28-gauge in whatever action you prefer, but never go tighter than improved cylinder in the choke. A light load of No. 7½s or No. 8s is best, since these birds are fragile and easy to bring down.

A trick worth remembering is to hold your fire until the woodcock finishes rising. The moment it has raised itself out of the thick cover and has accelerated horizontally is a good time to fire. If a bird gets up real close, though, it may pay to let it fly a few yards away before firing, so your shot pattern can open up a bit.

If you don't connect, watch where the bird flies. Woodcocks seldom travel far, at least on the first flush, and you can often follow them up and get a second try. If you do hit your target, it's vital that you mark where the bird dropped by lining up some object in your vision so you can head directly to it. If you keep your eyes focused on the spot and walk straight to it, chances are good you'll find your quarry.

If you've neglected woodcock because you thought they were a game bird strictly for those with dogs, think again. Walking up woodcock offers some of the most exciting and challenging upland wing shooting you can find. It's truly hunting at a different pace. ⊠

GERALD A. ALMY

When walking up woodcock, *pause periodically to simulate a predator that has located its prey. Woodcock are notorious for holding tight in close situations. This hunter downed a woodcock by slightly delaying his shot, which allowed his shotgun pattern to open more.*

DUPED!

photographed by F. Eugene Hester ©2000

Wood ducks have been known to fall for decoys, but these seem to have been completely bamboozled.

Wildlife photographers spend a lot of time in blinds, waiting for their subjects to move closer so they can get a better shot. The only trouble is that the animals often know the photographers are there, and remain frustratingly just out of range.

"I wait for them to get closer, and they wait for me to leave," explained photographer Gene Hester.

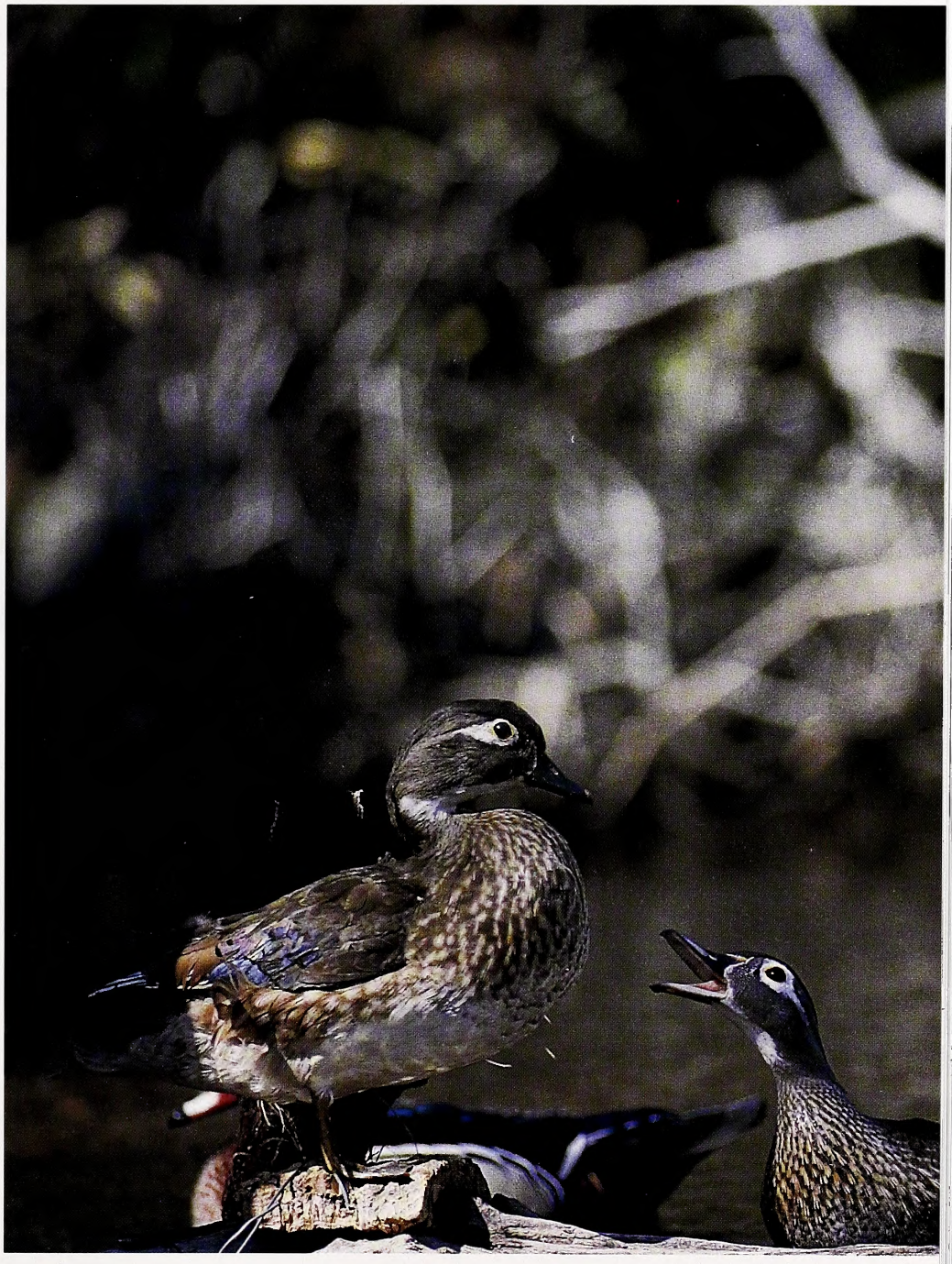
Tired of the waiting game, Hester tried something else. One day, he wired a stuffed hen wood duck to a log near his blind, and then watched to see what would happen.

"The whole idea was to get the woodies to feel comfortable and draw them closer to me," Hester said. It worked, but as these photos show there were some unexpected goings on.

One drake (left) seemed fascinated by the hen, staring intently at its strangely glassy eyes (imagine the love theme from "Doctor Zhivago" playing in the background). A hen took a more direct approach (right), quacking aggressively at the inert stranger. Neither gambits elicited much comment from the duck.

Other woodies ambled onto the log companionably, and then ignored the dummy (bottom), as if to say, "She's a little different, but she's all right."

Uncle Remus might have put it this way: "Ol' wood duck hen, she say nothin'." ⊠



A Brief Glance Backwards

Since European settlement, humans have shaped North Carolina's wildlife populations in radical ways. On the threshold of a new millennium, let's take a quick look back at the impacts we've made on wildlife in North Carolina.

written by T. Edward Nickens ©2000

North Carolina history has its shining moments: the Lost Colony, pirates and privateers, the momentous battles at Guilford Courthouse and Bentonville, the Wright brothers' flight. And hurricanes, hurricanes and more hurricanes.

But North Carolina also has played a remarkable role in the history of wildlife and wildlife conservation. The state was the first to publicly fund game wardens, led the nation in shorebird protections and has made remarkable recoveries of once-rare creatures: white-tailed deer, beaver and wild turkey.

As we enter the 21st century, it's only natural to take a brief glance backwards. The wildlife of North Carolina—and the ways humankind has interacted with that wildlife—tell us much about who we were as a people, who we are and who we can become.

This time line of wildlife history does beg one question. Why begin with the arrival of Europeans and Africans? To be sure, this state's Native Americans had interacted with and impacted wildlife populations for millennia. But just as surely, the impact of those Cherokee and Saponi and Tuscarora peoples could hardly approach the radical rearranging of landscape and the land's wild creatures brought about by the ceaseless wave of new Americans.

Now, let's turn back the pages of wildlife history.

N.C. ARCHIVES AND HISTORY

1524

The first European to sail the coast of North America, Giovanni da Verrazano, reports "great fires" along the coast, an early hint of Native American manipulation of the land.

1584

Captain Arthur Barlowe, sailing for Sir Walter Raleigh, describes a flock of white "Cranes"—likely snowy or great egrets—on Roanoke Island. It is the first English record of an animal in North Carolina.

1664

William Hilton threads the Cape Fear shoals and continues upriver past the present-day Wilmington waterfront, reporting that his company "heard several Wolves howling in the woods, and saw where they had torn a Deer to pieces."

MARK CATESBY

1587

Thomas Hariot assembles a list of 28 "sorts of beasts" and 86 birds from around Roanoke Island, including the first mention in an English text of the Carolina parakeet.

1698-1715

The skins of more than a million deer are shipped out of the colony.

COURTESY OF UNC PRESS

1701

Explorer John Lawson enters North Carolina near Waxhaw. Eight years later Lawson's journals are published in London as *A New Voyage to Carolina*. The book becomes an international best seller.

1728

While surveying the disputed boundary line between Virginia and North Carolina, one of William Byrd's men shoots at a buffalo in the northeastern corner of present-day Person County.

1729

The first phases of Mark Catesby's two-volume masterpiece, *The Natural History of Carolina, Florida, and the Bahama Islands*, appear. The work includes 220 color plates.

1737

John Brickell writes that elk are "plentifully to be met with" in the savannas of the western North Carolina Piedmont. He referred to *Cervus elaphus canadensis*, the eastern elk subspecies of North American elk.

1745

The Province of North Carolina passes the first wildlife protection legislation, an act "to prevent killing Deer at unseasonable Time."

1752 While on a reconnoitering survey of North Carolina, Moravian bishop August Gottlieb Spangenberg camps near Table Rock Mountain, near present-day Morganton, and hears wolves howling "such music of 6 different cornets the like of wh[ich] I have never heard in my life."

1760 A flock of passenger pigeons roosts near present-day Winston-Salem, assembling there "every Night for a Month together, in a small District, perching manyfold upon one another, so as by their Weight to break down the largest Limbs of Oaks, bending the Tops of others to the Ground, which was covered more than one foot high with their Dung."

1764 Rowan County pays out bounties for no less than 41 wolves, 13 "Catts," and five panthers.

1768 An act passes in North Carolina "the better to [en]able the Industrious Poor of this Province to discharge of their annual taxes" by paying with deerskins, "not weighing less than one pound each" and valued at 2 shillings and 6 pence per pound.

1799 Last record of buffalo in North Carolina, an animal reportedly killed near Asheville.

1775 William Bartram, who explores the Southeast's Coastal Plain during his four-year botanizing odyssey in the early 1770s, passes through mile upon mile of longleaf pine forest in North Carolina and describes them: "We find ourselves on the entrance of a vast plain...mostly a forest of the great long-leaved pine."

MARK CATESBY

1809 Ornithologist and painter Alexander Wilson kills ivory-billed woodpeckers near Wilmington. This is the state's sole record of the swamp-loving bird.

1850 First house sparrow, a British species, is released in Brooklyn. Sixty years later the nest stealer was one of the continent's most numerous birds.

1859

N.C. ARCHIVES AND HISTORY

Chesapeake and Albemarle Canal is completed from Currituck Sound to Norfolk, giving Currituck market hunters direct access to northern game markets.

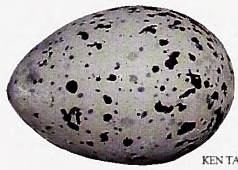
1880 4,300 rainbow trout from the western United States are stocked in streams in the upper Catawba River basin.

1887 The last record of a gray wolf killed in North Carolina, occurred in Haywood County.

1888 George Washington Vanderbilt visits the booming resort town of Asheville. He buys 120,000 acres of the "Pisgah Forest" and anchors them with the 250-room French Renaissance-style Biltmore House.

1890 The American Acclimatization Society, an organization dedicated to establishing American populations of every bird mentioned in the works of Shakespeare, releases 60 starlings in New York City's Central Park.

1894 A female passenger pigeon, the last of the species recorded in the state, is collected near Weaverville.



KEN TAYLOR

1903 T. Gilbert Pearson, founding father of the Audubon Society of North Carolina, estimates that only a dozen least tern eggs are laid on the Tar Heel coast, where 15 years earlier a half million adults could be found.

1903 On March 6 the Audubon Act becomes law in North Carolina, making it unlawful to kill any wild bird other than a game bird (liberally defined to include such table fare as the plover, robin and meadowlark) and various nuisance birds. The Audubon Society of North Carolina is given authority as "bird and game wardens" to act on behalf of the state. This is the first state wildlife protection system in the South.

1904 Chestnut blight is detected in trees at the Bronx Zoo. The first victims in the Great Smokies were found in the mid-1920s. By 1938, 85 percent of the national park's chestnut trees were dead or mortally afflicted.

1910 The Baynes Act passes, banning the sale of native wild game in restaurants and markets throughout New York. Currituck Sound market hunting for waterfowl begins to decline.

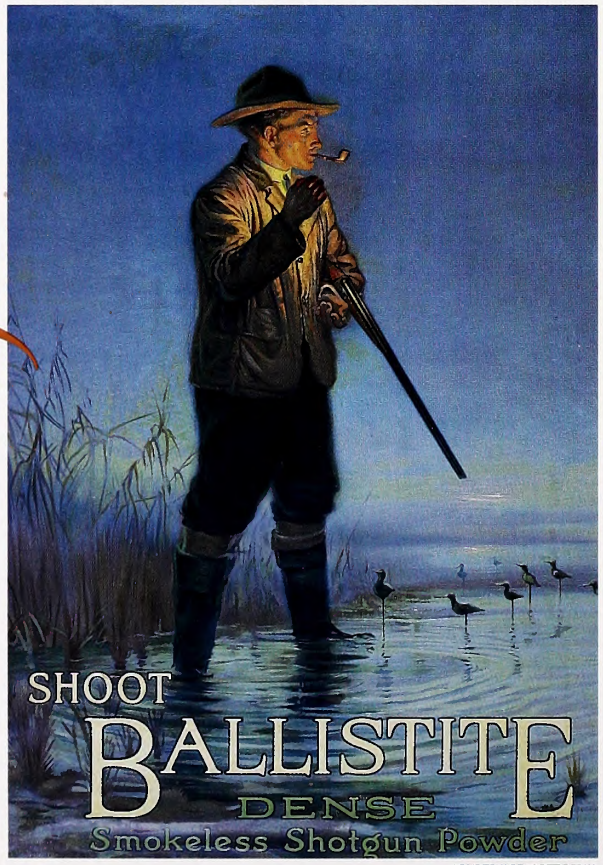
1911

N.C. WILDLIFE RESOURCES COMMISSION

The federal Weeks Act, authorizing purchase of lands for a national forest system, passes. Pisgah National Forest, the first eastern national forest, is established five years later, much of it from the old Vanderbilt estate.

1912 Fourteen European wild hogs are released on a private game reserve on Hooper's Bald in Graham County. The animals escape and reproduce, eventually spreading throughout the Smokies, causing ecological damage to wild plants and competing for food with bears and other native wildlife.

1918



COURTESY OF SCOTT DERKS

Migratory Bird Treaty Act between the United States and Canada makes it illegal to "capture or kill, possess, offer for sale..." any migratory bird included in the legislation, which covers all waterfowl species.

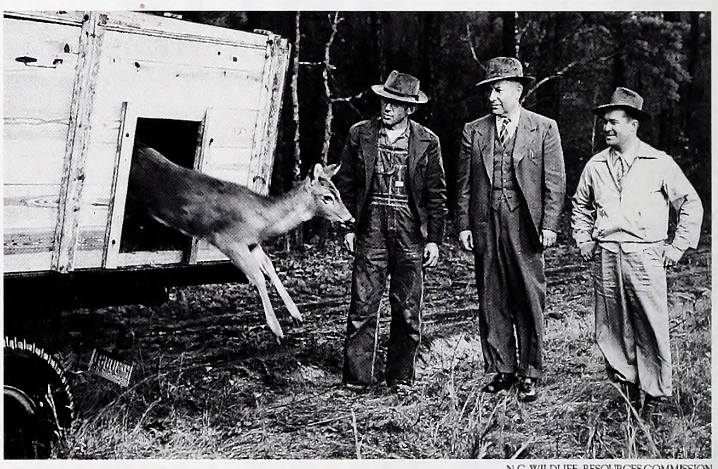
1918 Incas, the last Carolina parakeet, dies at the Cincinnati Zoo on Feb. 21.

N.C. WILDLIFE RESOURCES COMMISSION

1926 Great Smoky Mountains National Park is established.

1927 North Carolina Game Law is enacted, establishing statewide hunting regulations. Killing of doe deer is prohibited for five years.

1928 Deer restocking begins in the Mountains. From 1928 to 1944, 344 deer from the Pisgah Game Preserve are released on seven wildlife management areas.



N.C. WILDLIFE RESOURCES COMMISSION

1928 The state approves a $10,000 appropriation to fund a bounty of 25 cents for hawks and crows (crows are notorious quail nest raiders) and $2 for bobcats.

1937 Carolina Bird Club forms.

NCWRC

1937 The federal Pittman-Robertson Act establishes funding for wildlife restoration and research. North Carolina receives approximately $65,000 the first year. Its first project: a five-year study of the state's quail and mourning dove populations.

1939 Twenty-nine beavers from Pennsylvania are released in the Sandhills Wildlife Management Area near Rockingham. They soon grow to 100 colonies.

1945 North Carolina Wildlife Federation is established to lobby for science-based wildlife management.

1946 Statewide wild turkey restoration program begins.

KEN TAYLOR

1950 The long-leaf pine has vanished from 97 percent of its former range across the Southeast.

1947

North Carolina Wildlife Resources Commission is established.

1963 A massive fish kill occurs along 120 miles of the Roanoke River. The state authorizes State Stream Sanitation Committee to collect monetary damages, a milestone in environmental legislation.

GREENSBORO DAILY NEWS- 9-14-32

Favor a Game Commission On Self-Supporting Basis

Waltonian Council, In Convention Here, Would Divide State Into Five Districts—Lindsay Re-Elected President and Other Officers Named.

David J. Lindsay, of Rutherfordton, was re-elected yesterday afternoon as president of the Waltonian Council of North Carolina following the withdrawal from nomination of Lucian I. Strauss, of Greensboro, and J. P. Stowe, of Charlotte. Ivy Cowan, of Spindale, was chosen secretary.

each district, to be appointed by the governor from three names proposed by sportsmen in each district. The members also recommended that the commission be relieved from relying upon the taxpayers for support but be maintained from fees collected directly from licenses.

The legislative committee agreed

1972 With the state's wild turkey population estimated at only 2,000, fall turkey hunting is banned. A spring gobbler season is established.

1973

Endangered Species Act is passed.

1983 North Carolina's first successful bald eagle hacking occurs at Lake Mattamuskeet.

N.C. WILDLIFE RESOURCES COMMISSION

1977 The brook trout has disappeared from 70 percent of its original range in the Great Smokies due to habitat loss and competition from non-native species including rainbow trout.

1987

MELISSA McGAW

Two red wolves, born and raised in captivity, are released at the Alligator River National Wildlife Refuge. This is the first time in history that an endangered species extinct in the wild is returned to a portion of its former range.

1991 Protection efforts on behalf of the red-cockaded woodpecker lead federal courts to rule that federal agencies must protect the habitat of endangered species.

MELISSA McGAW

1997 The Fisheries Reform Act passes to set into motion development plans for declining marine fish stocks.

1991

The first bald eagle nest documented in the North Carolina Piedmont in decades is discovered in a tree on the banks of Jordan Lake.

1996 The state hires a full-time Partners in Flight coordinator. Partners in Flight is an interagency, multinational effort to stem the loss of bird biodiversity.

1999

The Wildlife Resources Commission declares the wild turkey fully restored in North Carolina. Statewide population is estimated at 100,000. In 50 years, more than 5,000 birds have been trapped and released. ⊠

KEN TAYLOR

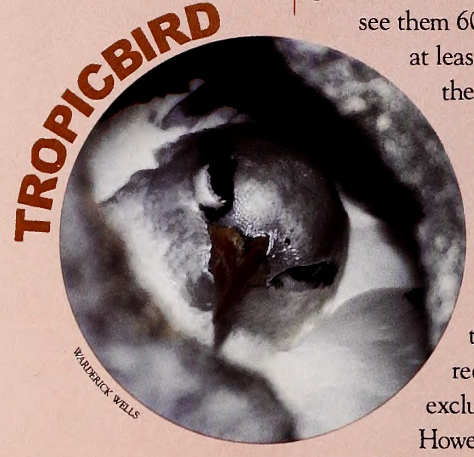
birds that nest in CAVITIES

For a lot of birds, a hole is a coveted site for rearing their young. No wonder. It's protected from most predators, sheltered from the elements and doesn't require any building skills.

written by David S. Lee ©2000

Early one morning, on a remote island in the central Bahamas, I watched a tropicbird circle over a distant pile of rocks, land and enter a hole. The birds were returning from long hours at sea and were bringing food back to incubating mates or to their fat, downy young. I was studying this particular nesting colony to learn more about a seabird that occurs regularly over the Gulf Stream. Were some of these very birds the same ones I was seeing off Cape Hatteras?

While climbing down to the nest site, I heard loud screams and saw two birds flapping and tumbling onto a narrow ledge. Their bills were locked together. In their zeal to get a dominant position, the evenly matched pair tumbled over the cliff, their bills still tightly locked. I could see them 60 feet below, wet, largely submerged and still flapping and screaming. It took me at least five minutes to work my way down to the water and somehow drag them from the sea, separating them by securing one under each arm.



Had I not intervened, both birds surely would have drowned. This aggressive behavior is not unusual in tropicbirds and other cavity-nesting species. In Bermuda, white-tailed tropicbirds will enter the same burrows used by the rare and highly endangered Bermuda petrel, kill the petrel chicks and take over the burrow. Indeed, the number of available nesting sites is what regulates tropicbird populations. The limited number of nesting sites is not just a problem for the white-tailed tropicbirds I was studying. Deeper in the West Indies, the larger red-billed tropicbirds, which begin nesting earlier in the year, have completely excluded white-tailed tropicbirds from all available nesting holes at some sites.

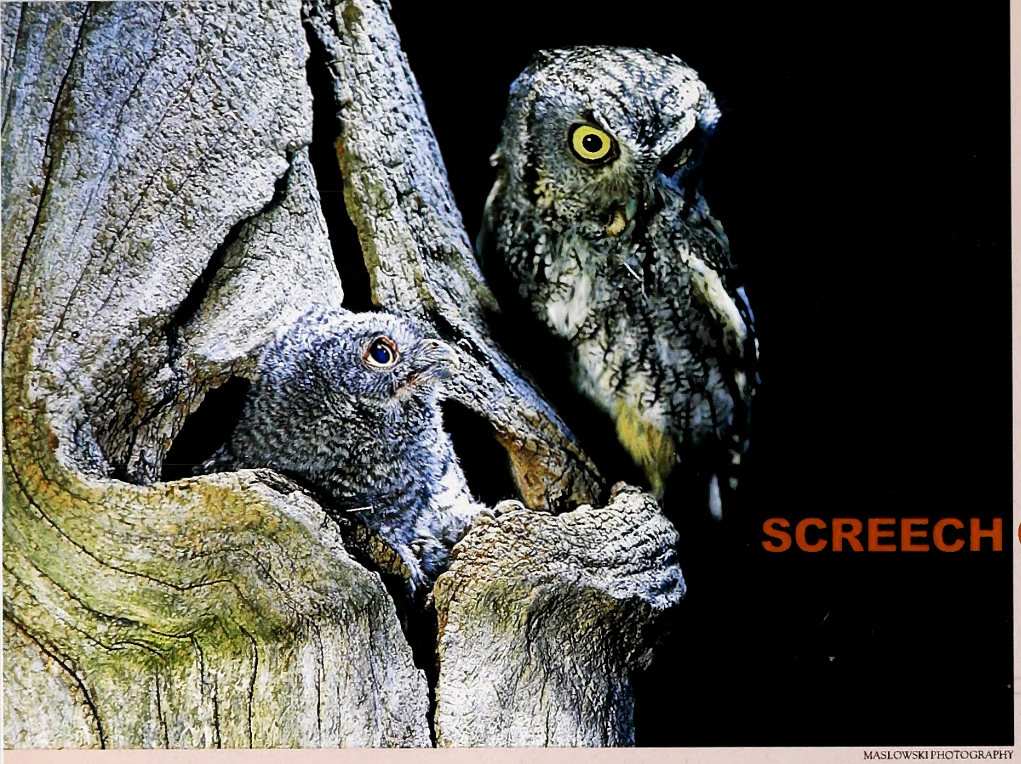
However, you don't need to go to remote West Indian or oceanic islands to observe competition for nest cavities. For our woodpeckers, chickadees, titmice and bluebirds, nest cavity defense is an annual ritual, and aggressive defensive behavior is important if the nesting pair expects to successfully raise its young. These battles occur between pairs of the same species and also between species. At stake is not just the exclusion of an individual from a particular nest site, but sometimes even the displacement of a species from part of its range. Bewicks' wrens, once one of the most common rural birds in the state, have now all but disappeared from North Carolina and, indeed, from the eastern United States. The house wren, a more aggressive bird that historically did not even nest in the state, has displaced the Bewick's wrens.

The shifting of many birds' ranges is apparently based on battles, won and lost, over nesting cavities. We may have thought of our rooms in college dorms as holes, but for many of our nesting birds found on the following pages, real holes are a matter of life and death.

MASLOWSKI PHOTOGRAPHY

Kestrels require protective *cover for nesting but can use a whole spectrum of nest sites. They will nest under ledges and eves in downtown buildings, in hollows in trees and cliffs, and even in bird boxes. Several years ago I was amazed at the number of kestrels I was seeing on a small cay in the West Indies. The high population was the result of the local abundance of small lizards. There were no apparent nesting sites to be found and the vegetation was too young and too sparse to provide cavities. When I asked some young boys where the birds raised their young they pointed to a rusting abandoned car. Sure enough, every abandoned vehicle I checked had a kestrel nest.*

KESTREL



MASLOWSKI PHOTOGRAPHY

SCREECH OWL

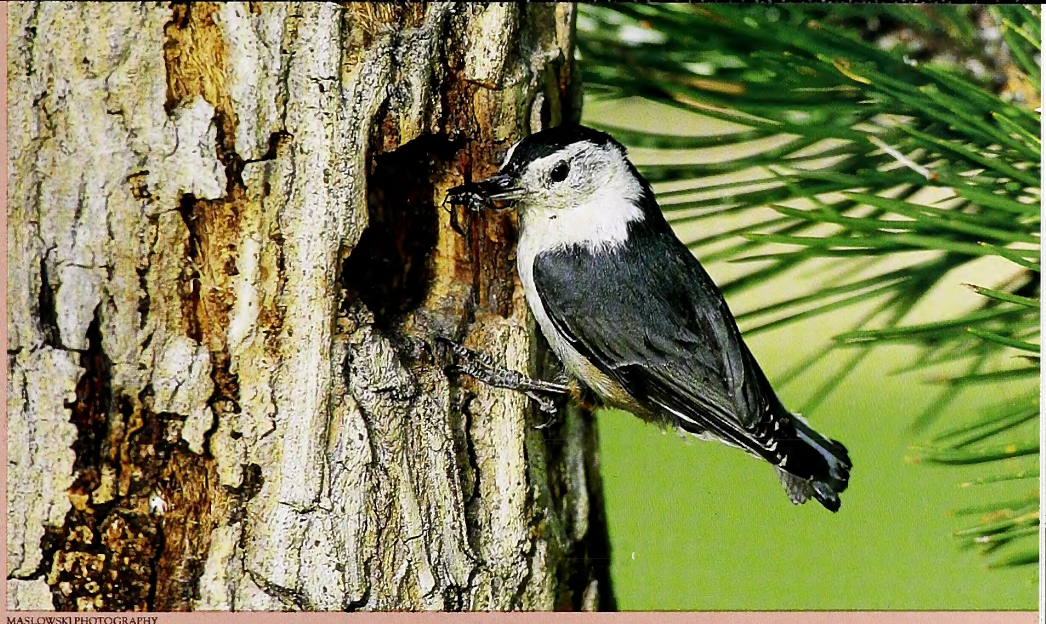
Except for the great horned owl, *which will nest in old crow and hawk nests, our other nesting owls all use cavities. Most, like this screech owl, nest in natural cavities. For small species, like screech and saw-whet owls, forest age is not a serious problem. For larger ones, like barred owls, mature woodlands are required. Trees must be both large enough and old enough to have cavities of the dimensions needed to house adults and five or more growing young. Barn owls are our most versatile cavity-nesting species. They too use natural tree cavities, but also nest in attics, barns, duck blinds, under bridges and in caves.*

DERRICK HAMRICK

WOOD DUCK

Wood ducks are cavity nesters *and when nest sites are scarce these ducks are often forced to use cavities far from water. The young ducklings must follow the adults to the nearest water. Competition with other species for nesting sites is common and competitors include hornets, honey bees, squirrels, starlings, screech owls, sparrow hawks and hooded mergansers. Hooded mergansers as well as other female wood ducks are known to dump their eggs in established wood duck nests, leaving the owners of the nest to care for foster ducklings. In some cases more than 30 eggs are deposited in a single nest cavity. It's a system that normally works and the adoptive female looks after the aggregate collection of offspring. Yet in one documented instance a female hooded merganser deposited her eggs in the nest of a barred owl. This makes one wonder how the ducklings liked their nightly deliveries of dead mice.*

A variety of songbirds *nest in cavities. Some, like the prothonotary warbler and great-crested flycatcher, rely on natural cavities or abandoned nests made by woodpeckers and other birds. Others, like our three species of nuthatches, dig out their own cavities, while others modify entrances and cavity dimensions to meet their particular needs. A few songbirds have cavity nests that defy classification. Long-billed marsh wrens make enclosed nests out of grasses and the nest chambers are technically cavities. Carolina wrens make similar nests but typically place them in protected places, including natural cavities and bird houses.*



MASLOWSKI PHOTOGRAPHY

WHITE-BREASTED NUTHATCH

BELTED KINGFISHER

Kingfishers dig their own nesting cavities, *but they need exposed banks free of vegetation in which to construct their nests. Natural erosion by rivers and streams is vital to the species' existence. Kingfishers lay six to seven eggs, and sometimes as many as 14 to 16. Like most cavity-nesters, kingfishers lay white eggs. Not only do eggs laid in holes not require protective pigments, but the all-white eggs may be easier for the incubating adults to see.*

DERRICK HAMRICK

Woodpeckers, like this common flicker, *are keystone species in woodland communities. They normally construct new cavities each time they nest, making surplus cavities. Woodpeckers create essential nesting units for birds that lack strong chisel-shaped bills and are incapable of constructing their own nest cavities. Our different-sized woodpeckers construct a whole spectrum of specific-sized apartments, and thus provide appropriate homes for a variety of birds.*

COMMON FLICKER

DERRICK HAMRICK

—David S. Lee is a curator of birds with the N.C. Museum of Natural Sciences in Raleigh.

KEN TAYLOR

PURPLE MARTIN

Martins, like many of our swallows, *are cavity-nesting species. Several swallows actually dig their own nest holes in exposed banks, one makes its own igloo-like nest chamber which it cements to bridge abutments, while others must rely on cavities excavated by other birds. As a group, swallows have expanded their breeding range into and across our state only in recent decades. This is a result of birds imprinting on bluebird boxes (tree swallows), or the availability of exposed banks resulting from road construction (bank swallows and rough-winged swallows).*

MASLOWSKI PHOTOGRAPHY

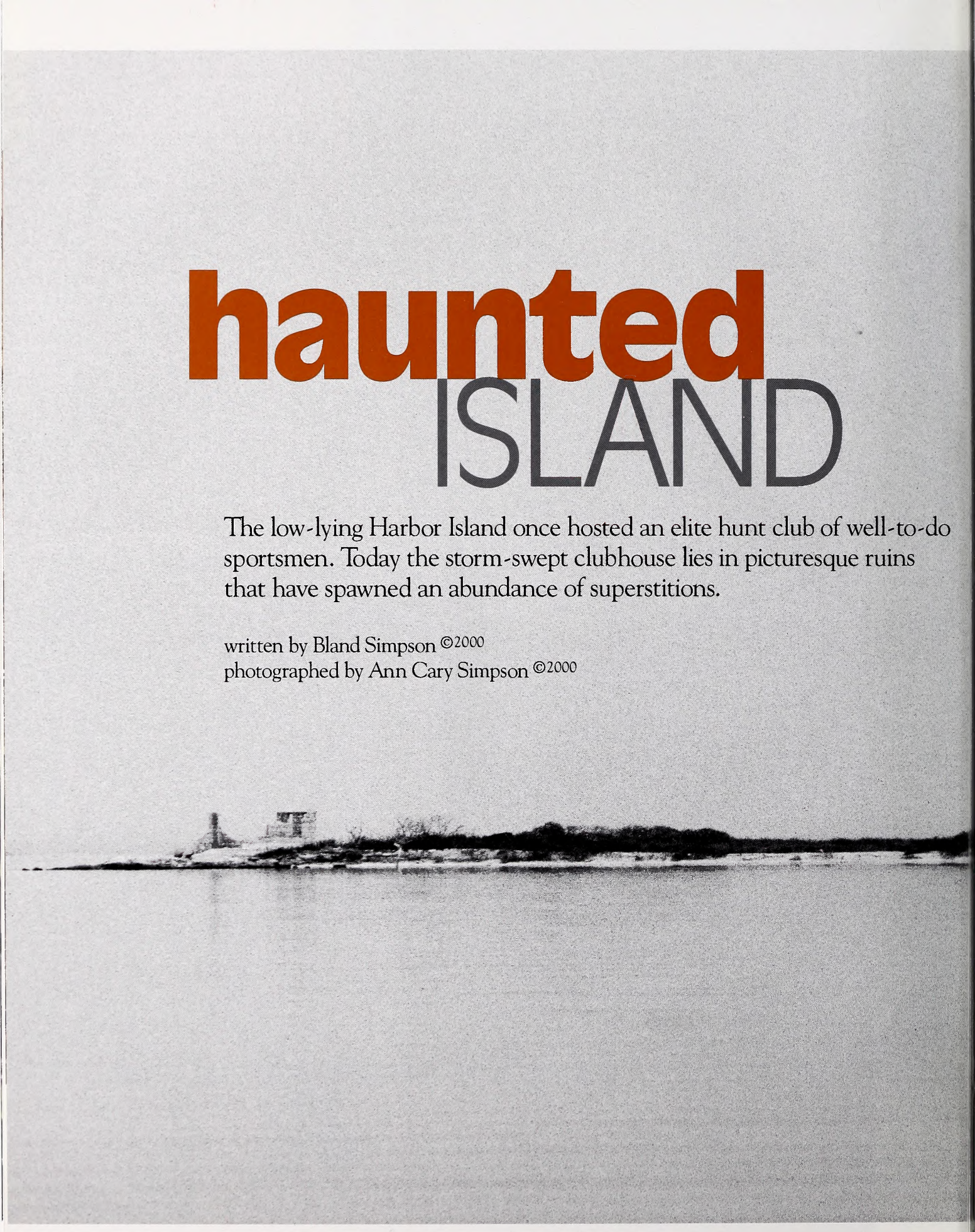
EASTERN BLUEBIRD

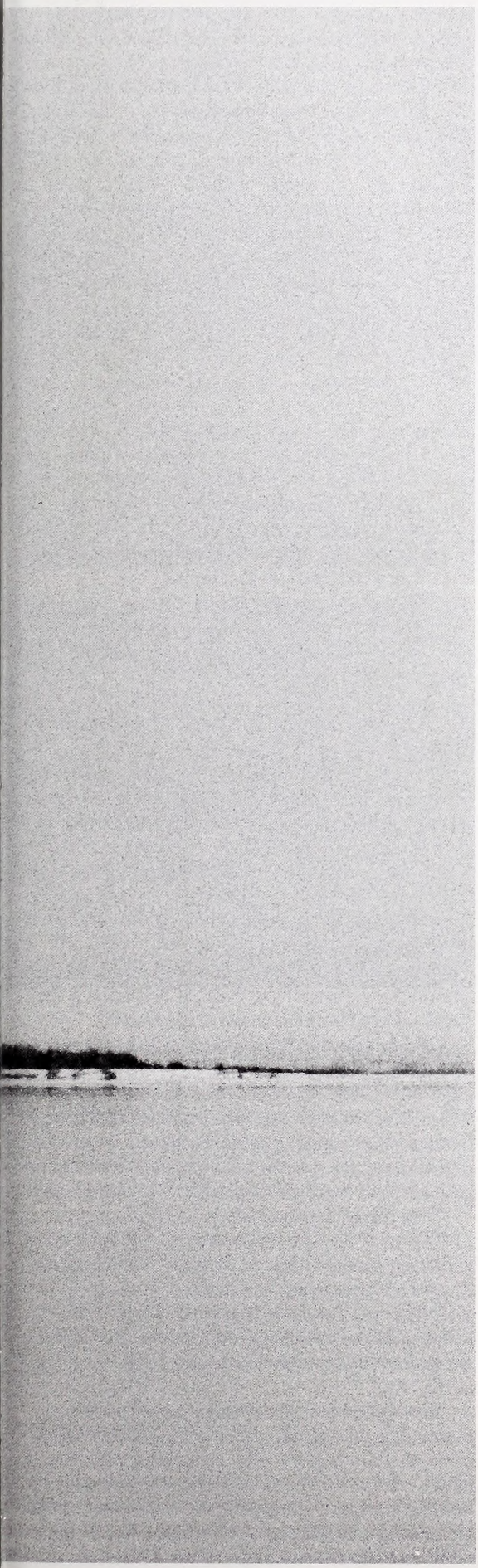
A number of cavity-nesting *birds have benefited from bird houses. The eastern bluebird is a prime example. It is a bird of open habitats, but with the coming of tractors to rural landscapes it became much easier to knock down dead trees at the edges of fields. These were the primary nesting sites of bluebirds. This was followed by the replacement of wooden fence posts with steel ones. Another important structure for nesting was lost. By the 1950s, before the widescale placement of nest boxes, bluebirds were becoming scarce in many eastern states. Today the construction and placement of bird boxes have proved important not just for bluebirds. Boxes with specific dimensions and exact-sized entrance holes provide key nesting structures for a variety of birds which were all previously dependent on natural cavities.* ⊠

haunted ISLAND

The low-lying Harbor Island once hosted an elite hunt club of well-to-do sportsmen. Today the storm-swept clubhouse lies in picturesque ruins that have spawned an abundance of superstitions.

written by Bland Simpson ©2000
photographed by Ann Cary Simpson ©2000





In North Carolina's sounds and coastal rivers are hundreds of islands, thousands perhaps, some marshy, some wooded, some sandy, most all of them lonesome, out-of-the-way places that nonetheless draw the traveler in. Like Coleridge's Ancient Mariner, each has a tale to tell.

One of the most interesting is Harbor Island, a scant half acre of bone-white shell bank at the north end of Core Sound, curving away to east and west, with a tabby-walled hunt club ruin at the western side of what little landmass it has. It's a small island. Seen from way over the waters, its diminutive ghostly ruin conjures up such long-ago and faraway images as old stone barns and roofless farmsteads that travelers glimpse across the endless barrens of Iceland. Closer to home, the old brick chimney towering on Phillips Island catches the eyes of pilgrims on the great Newport River bridge.

I first saw Harbor Island and its ruin on a clear, near-still August evening just after sunset several years ago, from the hurricane deck of Wilbur's Camp on soundside Core Banks. It lay about 3 miles distant from the camp, but in that twilight clarity it seemed closer, and my small binoculars brought the ruin right in close for inspection.

The tumbled-in lodge I saw was as intriguing to me now as it must have been in the early 20th century. Then it was whole and still functioning, and tycoons and regular mortals showed up out here for some of the best gunning in the Carolina east. Unroofed and with vacant, eyelike windows, the stranded ruin stood watch, staring at but passing no judgment upon all comers, human and avian, fisherman and crabber, plover and pelican, upon the long, broad waters of Core Sound below and the vast inland sea of Pamlico above.

"We used to come up here to picnic," Ann said the next morning, as we guided our Whaler north, following the boat-width channel from the creek at Wilbur's, bound for Core's own meandering mainstream, and boating along, around and occasionally through—when there were no nets or lines—the pound-net stakes set in the sound. "Mom and Dad would send us kids running over to find wild parsley behind the old clubhouse, to put on our sandwiches."

With us was our boatload of children: Cary, 4, the twins Hunter and Susannah, 12, and their friend Miriam Stone, all bathing-suited and all interested in any island outing that would involve swimming, whether or not it featured a pile of historic stones. There was little wind this summer morning, so the sound waters were almost slack, and we eased on in close to the goal. As we drew near to Harbor, some sort of islandic inversion was at work. The little shell bank somehow seemed smaller than it had appeared to me from back on the topdeck at Wilbur's Camp.

Top of Core Sound, shank of Pamlico Sound, here was Harbor in its full and current glory, sitting as delicate as a crescent moon upon the division between the sounds. The bow of the boat nosed into the shelly beach, which dropped off quickly, the runabout's stern being in a good 4½ feet of water. We gave each of the children a boat cushion and loaded them off the Whaler. We tossed a hook under the bow rail and watched Cary, who was already running for Harbor's eastern tip, scattering shorebirds as she shrieked with delight over the bright white trail through the docile summer waters.

The older children skipped shells and flopped in the shallows just clear of the boat, while Ann walked over toward the hunt club ruin. Its walls were a hearty admixture of concrete and all sorts of shells, the coarsest conglomeration I think I had ever seen that bore the name tabby. Near our home back upstate in the red-clay country was a big cistern that once powered the grindstones of a small turn-of-the-century gold mine, and that cistern's walls were tabby—but they were nothing like this. Harbor Island's concrete looked like it was being held together by the shells, rather than the other way around. Perhaps this was why the south wall of the structure now lay broken all to pieces in Core Sound, supporting nothing but salt air and blue sky. Or perhaps the waves and the wind that drives them would have knocked over anything so exposed, given enough time and tide and rising seas.

For an exposed spot, Harbor Island is just a dot in big, wide, open water. One wintry Sunday a half century ago, local decoy carver Julian Hamilton Jr. made a stormy dash from the banks across this portion of Core, which he recalled for *Wildlife in North Carolina's* Larry Earley just a few years back.

haunted ISLAND

Hamilton was in a 20-foot skiff he had borrowed from a cousin, and almost everything went wrong. Following seas came over his stern, his steering cable broke and the wind blew him sideways into nearby Wainwright Island, where he changed clothes and repaired the cable.

He then braced himself and took cold comfort running the lee of Harbor Island as he made for Cedar Island Bay, encountering 6-foot seas and a loon sleeping through the storm. When he finally got to Circle Bay, he was so shaken he told his father, "That's the last time I'll ever stick her out there like that."

The waves lapping Harbor this August, though, might not have topped 6 inches, so calm was the inside surf. Cary came back from the island's seaward end loaded down with special shells, then dropped them unceremoniously near the boat and made for the ruin, which Ann was just then stepping into as if she were walking through time.

And so she was. Ann had not been on Harbor Island in perhaps 20 years, and when I called and pointed out to her the deep green herbs growing with literal abandon just above the hunt club's north wall, she exclaimed: "The wild parsley! It's still here!"

Whereupon we picked and ate a couple of handfuls of the saltiest parsley we were ever likely to find in the state of nature in North Carolina. The Harbor Island variety was undeniably delicious, and decades of mutation, absorption and environmental merge had rendered it fit for only the most rigorous of high-sodium diets. It was a kick to see the parsley plants not merely growing or hanging on but absolutely flourishing out here, as much a monument to the hunters and their small, isolated order as the tabby ruin nearby.

The lodge had gone up in the late 19th century, when, according to waterfowling historian Jack Dudley, a New Yorker bought the property and with a group of Knickerbocker cronies formed the Harbor Island Club. Before the turn of the century, some New Jerseyites purchased the place and renamed it the Harbor Island Shooting Club. Not till the early 1910s did the place go native, when Carteret County's own Will Webb took over and sold shares in what was then the Harbor Island Hunting Lodge. One of the club's principals was John Motley Morehead III of Spray, a governor's grandson who was an inspired chemical engineer and major shareholder in Union Carbide. How much Morehead actually hunted out here is writ upon the Core Sound waters, but it couldn't have hurt the club to number among its members this future minister to Sweden and University of North Carolina benefactor, for among Morehead's well-heeled meditations was this motto: "Money doesn't bring happiness, but it helps quiet the nerves."

The tabby-walled structure had heart-pine timbers, brick-lined fireplaces and a little something more, as Dudley writes in *Carteret Waterfowl Heritage*, adding: "Folktales prevail with occasional rumors of a haunted clubhouse, and a twenty dollar gold piece placed in the walls when the club was built."

Harbor Island, haunted?

"A lot of the locals," a Sea Level man once told me, "they won't even set foot on it."

"Why's that?" I asked him.

"And the ones that do, they'll not be on it after dark. Some Cedar Islanders won't even go by it in their boats after dark."

"But why?"

"I don't know," he said. "You can't get 'em to talk about it."

One who would talk was Royce Emery, an unsuperstitious fisherman who was born on Cedar Island and has lived there all his life, except for time spent in the navy during World War II. "Fellow from New York—Pike—was the one who owned it," Emery said to me. "Somebody claimed they had a black cook there who disappeared one night, and no one knew what happened to him.

"Ever since then folks have seen a light. Edwin Daniels said he saw a light. Atlantic fishermen going back and forth have said they've seen lights."

Emery was out shrimping once years ago, working on a 35-foot boat, and his craft lay at anchor for the night, along with a bunch of others, there at Harbor Island. This was after the lodge had been abandoned but was still standing, more or less intact. "About one in the morning, someone woke Captain Goodwin up and said there was a woman hollerin' in that house!"

"Was there?" I asked him.

"No-o-o," he said quickly. But he recalled another unsettling incident about the place. "Will Webb from Morehead, his wife was in the big room down below, said there was a man looking in the window. They looked all over the island, couldn't find anyone, but she never would go down there after that—happened in the '40s."

It has been 80 years now since sportsman Rex Beach—the novelist who gave the world *The Spoilers*—came out here to hunt geese, wandering right by Harbor Island in a 55-foot, shallow-draft floating hotel he'd engaged in Beaufort to take him and sportswriter Grantland Rice up to Ocracoke. Beach humorously wrote up the trek in *Oh, Shoot!* (1921), observ-

"Its walls were a hearty admixture of concrete and all sorts of shells, the coarsest conglomeration I think I had ever seen that bore the name **tabby."**

ing that "this stormy Hatteras region is the Palm Beach of the Canada goose and his little cousin the brant."

Maybe what haunts Harbor the most is really our sense that whatever geese and ducks and brant still come this way are mere tokens of the millions that once flew here and challenged the hunters who lay below in bushy blinds and sinkboxes, and who stayed in the sound country's little lodges. And what of other shades, the ghosts of our fisheries, say, or the phantoms already afoot about our shallows and low-lying shorelines? How much of coastal Carolina will fade and be reshaped by the next one-foot rise in sea level, coming as it is not over a century but over the next 30 or 40 years? How many inundations like the ruinous fall floods of '99 will we face, and how awesome will they be?

Brant Island in the Pamlico is already a marshy shoal, and Batts' Grave in the Albemarle, which was 20-some acres of orchard and farm only 300 years ago, is now all underwater near the mouth of the Yeopim River. Harbor Island was reckoned at 5 acres when the New Yorker Lawrence Pike got ahold of it in 1886, and today, as Royce Emery judged, marking the toll that hurricanes Dennis and Floyd had just taken on what was left of Harbor, "That island's about gone now."

After an hour and a half with Ann and the children on Harbor Island, we embarked for Wilbur's Camp, our inspection over, and the shell bank fell away behind us and went back to being a floating, haunted ruin in the distance. Last winter with Ann's father, Dr. John Kindell of Sea Level, she and Cary and I went back again on another bright, calm day. A very light, cold breeze was coming from the south, the waters in the upper side of the landward reef of shells were flat calm, and the walls of the ruin were mirrored in them, like Poe's storied House of Usher that was reflected, "remodelled and inverted," in the lake below.

Davy Jones' locker is large, indeed, and most of the shell bank that got named and known as Harbor Island is already in it. For a spell yet, enough of it remains for watermen to mark passage by it from Core to Pamlico, enough of it, too, for it to be counted in the line of small islands strung across north Core from Hog Island toward the banks: Chain Shot, Harbor, Wainwright and Shell. Enough to seek out, to stalk about on, to sit upon and eat salt parsley and ruminate over the fate of man, fish and fowl, and lands so low, as the tide keeps on rolling in, rising all the time. ⊠

Bland Simpson, a UNC-Chapel Hill creative writing professor, is the author of Into the Sound Country. *The Simpsons are at work on a book about North Carolina's inner islands.*

If you were growing up in North Carolina 100 years ago, you would almost certainly know the eastern bluebird. You would hear its gentle song in the spring. When you walked to school, you might see a flash of bright blue wings. Near home, you might watch a pair of bluebirds nest in a tree hole. But today many people never see or hear a bluebird.

Come Back, Bluebirds!

written by Buffy Silverman / illustrated by Consie Powell

WHERE HAVE ALL THE BLUEBIRDS GONE?

Like all animals, bluebirds need a **habitat** where they can find food, water, shelter and can nest and raise a family. But during the past century the land where bluebirds once lived has changed.

Bluebirds prefer open country with scattered trees where they can hunt grasshoppers, crickets, beetles, caterpillars and other field insects. They are **cavity nesters** that build their nests in tree holes and other sheltered openings. In fall and winter, when the weather turns cold and insects are gone, bluebirds move to forest edges and eat berries they find on trees and shrubs.

When early settlers cleared forests to create their farms, bluebirds prospered as they found abundant fields for hunting insects. They built nests in the hollow trunks and branches of farmers' apple trees as well as in holes in wooden fence posts. Wild shrubs with berries grew along the edges of fields, supplying winter food.

By the end of the 1800s, however, towns were spreading to places where farms once stood. Dead trees were cut. Metal fence posts gradually replaced wooden ones. Bluebirds found fewer places to build their nests.

Bluebirds also faced another problem. Two species of birds brought to North America from Europe competed with bluebirds for nesting sites. House sparrows, introduced in 1851, and European starlings, which arrived in 1890, soon became more common than native birds and took over the dwindling supply of holes. The newcomers chased bluebirds away from nest cavities. They broke open bluebirds' eggs and killed **nestlings**. Flocks of hungry starlings devoured berries off shrubs in the fall, leaving too little winter food for bluebirds and other native birds.

Due to loss of habitat and competition for nesting cavities and winter food, bluebird populations plummeted. By the 1970s, the number of eastern bluebirds had dropped by 90 percent.

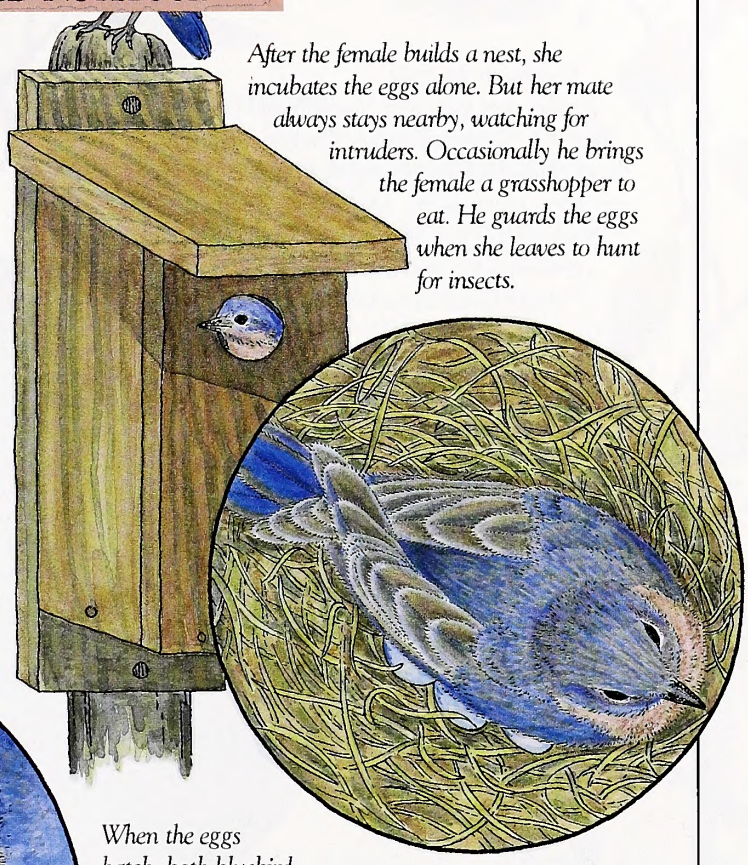
Bluebirds are devoted parents. In March, the male bluebird defends a territory with one or more nest sites. He sings to his mate until she chooses a place to build her nest.

A HOME IN A BOX

As many people who grew up watching bluebirds noticed that they saw fewer and fewer of them, they realized that there were no longer enough natural cavities for bluebirds to reproduce. To help bluebirds find places to raise their families, people put nest boxes alongside roads and in fields.

More and more people joined the effort to help bluebirds. Some groups set up trails with a thousand or more boxes. Today volunteers across the country work to increase bluebird populations and share information about preserving bluebirds and their native habitat.

The efforts of all these volunteers have made a difference for bluebirds. Bluebirds now nest in boxes all over North America.



After the female builds a nest, she incubates the eggs alone. But her mate always stays nearby, watching for intruders. Occasionally he brings the female a grasshopper to eat. He guards the eggs when she leaves to hunt for insects.

When the eggs hatch, both bluebird parents feed their hungry babies. Soon after the first batch of youngsters leaves the nest, the mother builds a new nest, preparing to lay a second or third **clutch** *of eggs.*

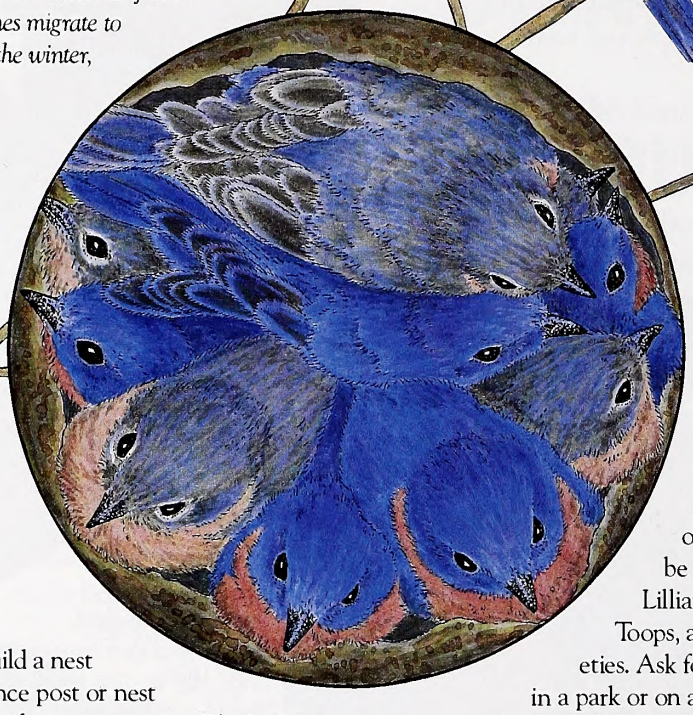
WHY DO NEST BOXES MAKE A DIFFERENCE?

Nest boxes are designed with bluebirds in mind. Small entrance holes keep out larger birds like starlings. By placing boxes away from buildings, people discourage house sparrows from taking over a box. Special designs prevent raccoons, snakes and other predators from reaching bluebird eggs and young. People who set out nest boxes monitor them and remove house sparrows' nests, watch for predators and parasites, keep boxes clean and keep track of the bluebirds' reproductive success.

Other native cavity nesters also benefit from the effort to help eastern bluebirds in North Carolina. Carolina chickadees, tufted titmice, Carolina wrens and house wrens all build their nests in available boxes.

The father still feeds the **fledglings** *and they follow him about, learning where and how to find food. Once the young have been out of the nest for about five weeks, they are on their own. Often they stay near and help their parents feed new nestlings.*

In autumn, bluebird families may join other bluebirds and form ***flocks*** *that stay together all winter. On very cold nights, flocks of bluebirds huddle together inside cavities or nest boxes to stay warm. Most North Carolina bluebirds stay put all winter. Bluebirds from northern states sometimes migrate to North Carolina for the winter, and return north when spring approaches.*



What Does It Mean?

cavity nesters: birds that build a nest inside a hole in a tree, fence post or nest box. Woodpeckers create their own cavities. Bluebirds and many other species rely on cavities that they find.

clutch: all the eggs laid or incubated at one time. Eastern bluebird clutches range from 1 to 7 eggs, usually 4 or 5 eggs.

fledgling: a young bird with flight feathers that has recently left the nest

flock: a group of birds that live, travel or feed together

habitat: place where a plant or animal lives

nestling: a bird that is too young to leave the nest

Read and Find Out

- *Bluebird Book: The Complete Guide to Attracting Bluebirds* by Donald and Lillian Stokes, Little, Brown and Company, 1991.
- *Bluebirds Forever* by Connie Toops, Voyageur Press, 1994.
- *Bluebirds in My House: Bonnie and Ben* by Arnette Heidicamp, Crown Publishers, 1997.
- *National Audubon Society First Field Guide: Birds*, Scholastic, Inc., 1998.
- In *Wildlife in North Carolina*
- "Return of the Bluebird" by Duane Raver, April 1980.
- "Return of the Bluebird" by Mike Overton, May 1983.
- "Dick's Gift" by Lisa Stroud, April 1996.

Editing and design by Consie Powell. Art puzzle by Anne Marshall Runyon.

Get Outside

You, too, can help bluebirds.

If there are fields or other open places near your home, prepare and set a nest box outside. Plans to make bluebird houses can be found in the *Bluebird Book* by Donald and Lillian Stokes and *Bluebirds Forever* by Connie Toops, as well as in materials from bluebird societies. Ask for permission to mount several nest boxes in a park or on a golf course.

Visit the box once a week during the nesting season. Watch from a reasonable distance and record your birds' comings and goings. Don't be discouraged if bluebirds don't find your box right away —it may be two or more years before bluebirds use a new box. Other native birds need places to nest, too. Watch their progress and report what happens in your box to one of the bluebird societies listed below.

Put out a bird bath or other container with water. Bluebirds and other birds will come for a splash. Plant shrubs with berries for winter food for the birds.

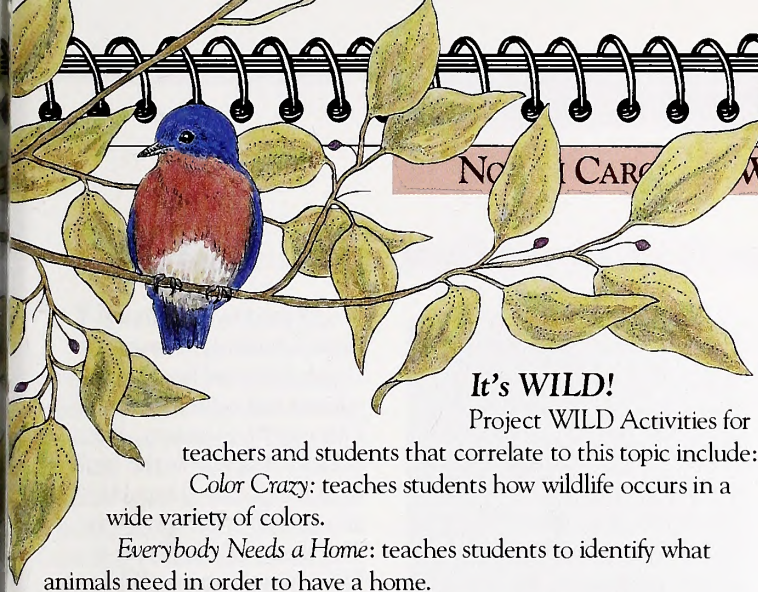
Help baby bluebirds by keeping your cat inside your house, especially in spring and summer. Hunting cats stalk and kill nestlings and fledglings.

Bluebird Societies:

North American Bluebird Society
http://www.nabluebirdsociety.org/index.htm. Lots of information about bluebirds, nest boxes, monitoring and links to other sites, including a place to report how many bluebirds fledged from your nest boxes.

North Carolina Bluebird Society
P.O. Box 4191, Greensboro, N.C. 27404

Rutherford County Bluebird Club
P.O. Box 247, Ellenboro, N.C. 28040
http://www.geocities.com/rainforest/andes/3523/



It's WILD!

Project WILD Activities for teachers and students that correlate to this topic include:

Color Crazy: teaches students how wildlife occurs in a wide variety of colors.

Everybody Needs a Home: teaches students to identify what animals need in order to have a home.

Improving Wildlife Habitat in the Community: teaches students the elements necessary to improve wildlife habitat in their community.

Get WILD

Advanced WILD Workshops:

March 11-12 – *Long Leaf Pine Forest Ecosystem*, First day in Fayetteville and second day in Southern Pines. Contact Katrina McDougald, (252) 823-7911.

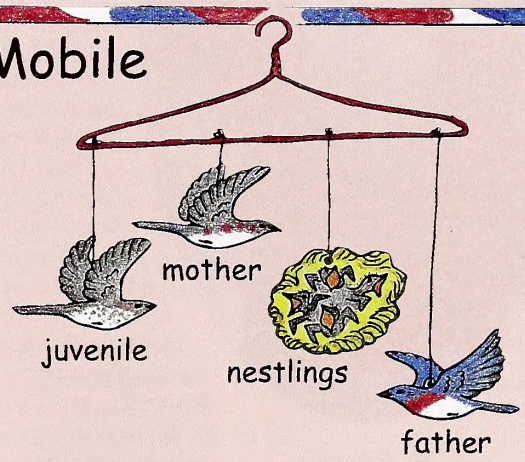
April 13-14 – *Living With Wildlife*, State Forestry Training Center, Crossnore. Contact Anne Hice, (336) 674-6152.

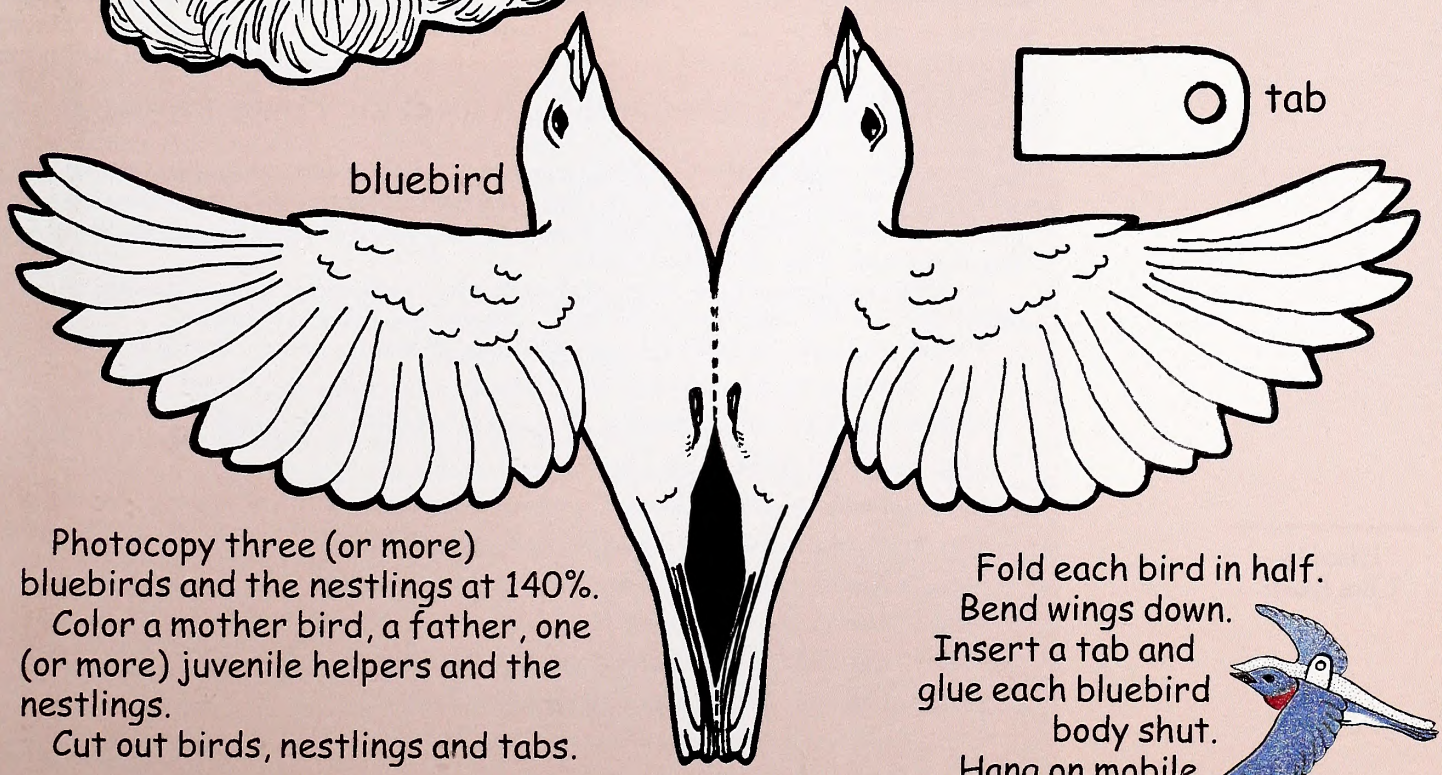
April 21-22 – *Migratory Songbirds*, Morrow Mountain State Park, Albermarle. Contact Mel Porter, (704) 982-1523.

May 6-7 – *Migratory Songbirds*, Howell Woods Environmental Learning Center, Four Oaks. Contact Howell Woods, (919) 938-0115.

A Bluebird Family Mobile

nestlings





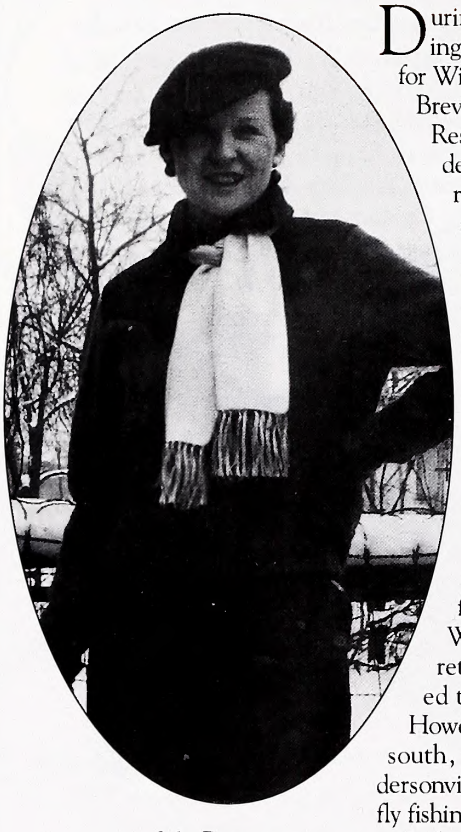
Photocopy three (or more) bluebirds and the nestlings at 140%.

Color a mother bird, a father, one (or more) juvenile helpers and the nestlings.

Cut out birds, nestlings and tabs.

Fold each bird in half.
Bend wings down.
Insert a tab and glue each bluebird body shut.
Hang on mobile.

Education Center Auditorium Dedicated to Contributor



Ms. Barsantee

During its October meeting at the Pisgah Center for Wildlife Education, near Brevard, the N.C. Wildlife Resources Commission dedicated the center's recently completed auditorium to the late Beatrice H. Barsantee. Ms. Barsantee willed more than $50,000 to the N.C. Wildlife Resources Commission in 1983.

Born in 1907, Ms. Barsantee worked as an attorney in Illinois and was married to Harry Barsantee, who served as an air force colonel during World War II. After both retired, the couple decided to move to Florida. However, during their trip south, they stopped in Hendersonville, N.C., to sample the fly fishing and were so taken with the area, they never left.

Upon the death of her husband, Ms. Barsantee established the Col. Harry Barsantee Scholarship Fund for students attending the School of Journalism at the University of Wisconsin. In addition, Ms. Barsantee left one-quarter of her residual estate to the Wildlife Commission to be used for conservation education near the Hendersonville area. The bequest, which totaled $56,692.85, became seed money for the Pisgah education center.

"The Barsantees, if alive, would undoubtedly be amazed at the results of their generosity," said Sid Baynes, chief of the Wildlife Commission's Division of Conservation Education. "Coupled with funding from various other private and public sources, the Wildlife Commission has been able to use this money to develop an educational center that all North Carolinians can be proud of."

Located in the Transylvania County portion of the Pisgah National Forest, the educational center is in its fifth year of operation. The primary function of the facility is to educate the public about wildlife conservation. The theme of the center is "Mountain Streams, Where Water and Life Begin." Through interactive displays and exhibits that focus on water, visitors experience the geologic formation of the region, gain understanding of the interactions among humans and the natural world and learn how the Wildlife Commission works to conserve the state's valuable natural resources.

The center's auditorium features seating for 130, surround sound and a video that orients visitors to the center and its educational trail, exhibits and programs.

—Chris Powell

Edited by Chris Powell

Wildlife Commission Schedules Nine Public Hearings

Sportsmen throughout the state will have a chance during the last two weeks of January and the first week of February to comment on proposed changes to hunting and fishing regulations for 2000-01 seasons. The N.C. Wildlife Resources Commission will hold public hearings on the proposals in each of the nine wildlife districts.

In addition to commenting on proposed changes, hunters and anglers will have the chance to submit proposals they would like the Wildlife Commission to consider in the future.

The following is the schedule for the public hearings (all hearings start at 7:00 p.m.):

- Jan. 18 - District 9 - Myers Auditorium, Southwest Community College, Sylva
- Jan. 19 - District 8 - City of Morganton Municipal Auditorium, Morganton
- Jan. 20 -District 7 - Starmount High School, Boonville
- Jan. 24 -District 4 - Bladen County Courthouse, Elizabethtown
- Jan. 25 -District 5 -Alamance County Courthouse, Graham
- Jan. 26 -District 6 - Central Davidson Middle School, Lexington
- Jan. 31 -District 1 - Swain Auditorium, Edenton
- Feb. 1 - District 2 - Craven County Courthouse, New Bern
- Feb. 2 - District 3 - Nash County Courthouse, Nashville

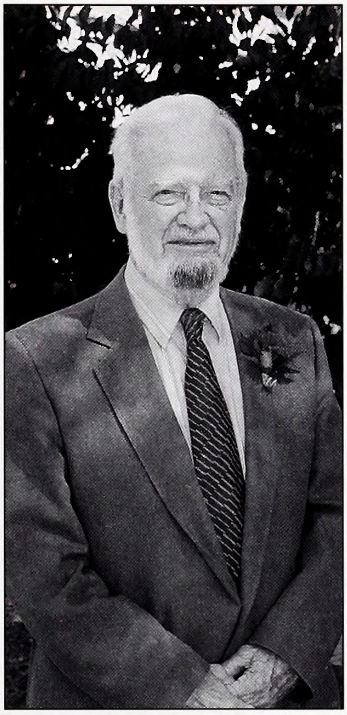
—Chris Powell

Retired N.C. State University Professor Honored

North Carolina State University honored one of its own recently when it named a student scholarship after retired ornithology professor Thomas L. Quay. The Thomas L. Quay Wildlife and Natural Resources Undergraduate Experiential Learning Award will be an annual award given to a student from the departments of environmental science, fisheries and wildlife science or natural resources.

The competitive award, sponsored by the departments of forestry and zoology, will be given to the student who shows strong leadership potential, high levels of academic achievement and future promise. It is intended to enable undergraduates to participate in activities such as internships and research projects. Funds for the endowment will be raised from alumni, faculty, professional associations and businesses.

Quay received one of the university's first doctoral degrees in 1948 and then taught in the university's fish and wildlife program for 32 years. He was a mentor to dozens of undergraduate and graduate students during his career, helping many to shape their careers in wildlife conservation.



KEN TAYLOR

Thomas L. Quay, *a retired N.C. State University ornithology professor, was recently honored with a student scholarship award created in his name.*

Since his retirement in 1980, Quay has served as a self-described "fulltime, volunteer, unpaid environmental activist" lobbying state agencies and legislators on behalf of a variety of conservation causes. In 1994 he was inducted into the N.C. Wildlife Federation's Conservation Hall of Fame.

"His name is synonymous with the fish and wildlife program," said Chris Wessel, director of departmental fundraising with the university's North Carolina Agricultural Foundation Inc., which will be raising money to fund the scholarship endowment. "There's probably no other person at N.C. State whose name is so universally recognized as Tom Quay's."

That sentiment is shared by F. Eugene Hester, a former student of Quay's who, before his retirement, rose through the ranks of the U.S. Department of the Interior.

"This award combines two great things," Hester added. "First, we're providing a scholarship for people in the fields of fish and wildlife. They need help and we ought to be doing what we can to support them. And secondly, we're honoring Tom Quay because he exemplifies a great college professor."

—Lawrence S. Earley

Contributor Omitted

The important contribution International Paper made to *Wildlife in North Carolina's* special issue "Rivers of North Carolina" was unacknowledged in the November issue. International Paper donated the cover stock for the issue, for which we are grateful. We apologize for this oversight.

PEOPLE ◇ CUSTOMERS ◇ OPERATIONAL EXCELLENCE
INTERNATIONAL PAPER

Topo Maps

Whether your recreation is hunting, fishing, hiking, bird watching or boating, good maps are a necessity for success and safety in the outdoors.

The North Carolina Geological Survey stocks topographic maps for every area of the state at a cost of $4 per map. In addition to topo maps, there is also a wide selection of geological publications available, many pertaining to recreational geology.

The Geological Survey's map and publication sales office is located in the basement of the Archdale Building at 512 N. Salisbury St. in Raleigh. To place orders or request more information, call (919) 715-9718 or write the NCGS at P.O. Box 27687, Raleigh, N.C. 27611-7687. Orders can also be faxed to (919) 733-0900 or placed by e-mail at ncs1440@interpath.com. Visit the NCGS' web site at: http://www.enr.state.nc.us/ENR/DLR/ncgeology/Default.htm.

Maps are shipped the same day orders are received. Sales are subject to a 6 percent sales tax and a small handling fee. MasterCard and VISA credit cards are accepted as well as personal checks and cash.

Wildlife Resources Commission Awarded Funding for Land Acquisition

KEN TAYLOR

South Mountains Game Land *(above) recently received one of six tracts acquired by the Wildlife Commission for game lands. The six tracts, spread throughout the state, total 14,000 acres.*

The N.C. Wildlife Resources Commission's game lands program recently gained six additional tracts totaling 14,000 acres, as a result of a $4,388,240 grant from the Natural Heritage Trust.

The largest acquisition is the 5,784-acre Van Swamp tract in Beaufort and Washington counties, which was purchased with $2.5 million from the grant.

Lake Logan, in Hayward County, is a 4,653-acre tract that received $1 million in funding. And Buffalo Cove—3,550 acres located in Caldwell and Wilkes counties—was purchased with a $500,000 grant.

The 300-acre Cranberry Iron Mine Tract, in Avery County, received $200,000 in funding. In addition, the 54-acre Terry Tract, in Rutherford County, was purchased with $103,740 and will be added to the recently acquired South Mountains Game Land. Finally, Three Top Mountain Game Land, in Ashe County, will grow by 53.8 acres, as a result of an $85,000 purchase of three small tracts.

Wib Owen, section manager of the Division of Wildlife Management's Land Management and Budget section, said the sportsmen and citizens of North Carolina owe members of the General Assembly and the Natural Heritage Trust trustees a vote of thanks for their efforts in acquiring public lands.

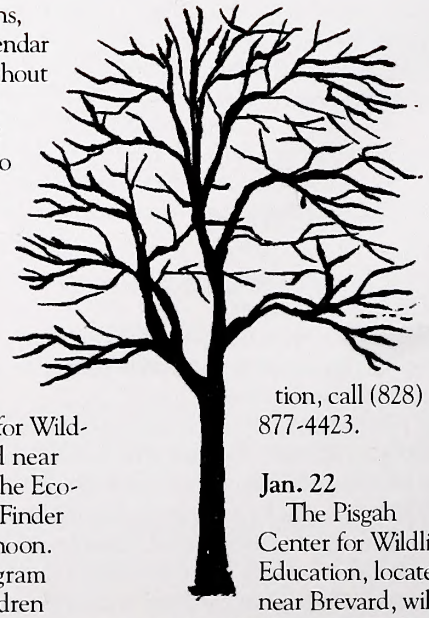
"The Natural Heritage Trust through its grants has provided a tremendous benefit to the Wildlife Resources Commission's land acquisition program," Owen said. "These funds have enabled the Commission to add thousands of acres to provide hunting, fishing and recreation activities to citizens in many sections of North Carolina."

Monies for the Natural Heritage Trust are provided by the General Assembly with the funds derived from real estate transaction fees and the sale of personalized license plates. The program was initiated in 1988, and the Wildlife Resources Commission's first grant was used in purchasing the Walcott Tract in the Green River Game Land, in Polk County.

—Bodie McDowell

North Carolina Outdoor Calendar of Events

On several occasions, events in this calendar have been changed without notice. Readers should check with the contact listed before traveling to an event. Items for listing should be conservation oriented and should be sent at least four months in advance.



Jan. 17

The Pisgah Center for Wildlife Education, located near Brevard, will conduct the Eco-Explorers Winter Tree Finder program 9:30 a.m. to noon. Eco-explorers is a program series that engages children ages 7 to 12 with the natural world. For more information, call (828) 877-4423.

Jan. 22

The Pisgah Center for Wildlife Education, located near Brevard, will conduct the Skin and Skulls program 1 to 4 p.m. Designed for participants 12 years of age and up, this hands-on program focuses on the identification of mammal skins and skulls and the investigation of predator-prey relationships and food chains. For more information, call (828) 877-4423.

Feb. 5-6

The Fifth Annual East Carolina Wildlife Arts Festival and North Carolina Decoy Carving Championships will be held at the Civic Center in Washington, N.C. The event will feature the unveiling of the original painting for the 2000 North Carolina Duck Stamp as well as nine carving competitions and much more. For more information, call David Gossett at (252) 946-2897.

Field Notes

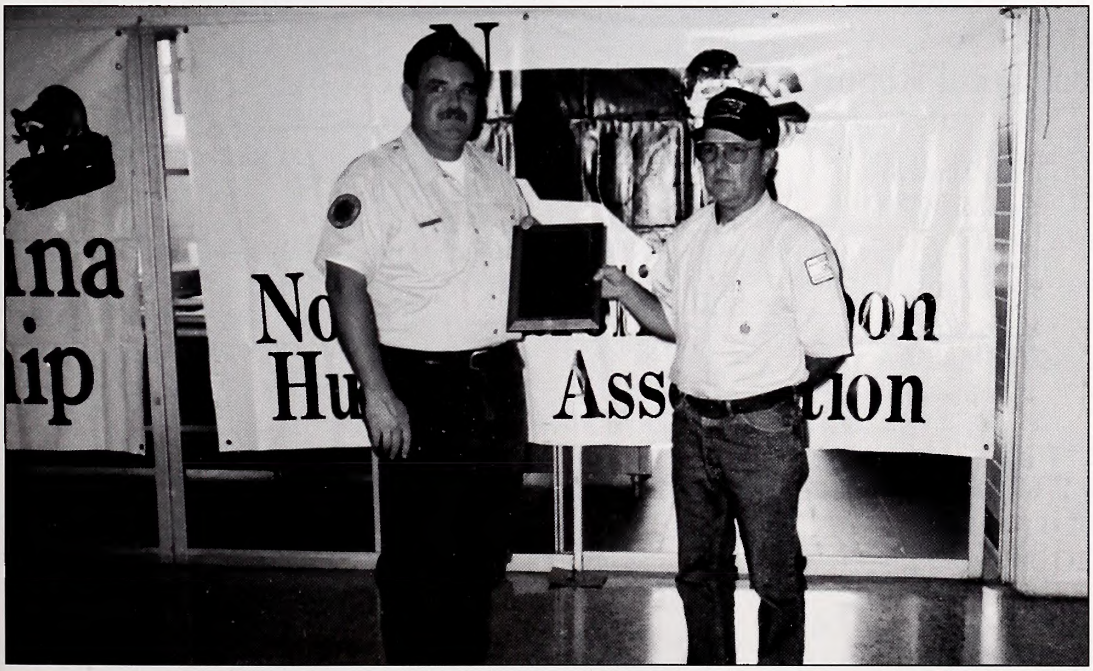
Gray Squirrel	Through Jan. 31
Rabbit	Through Feb. 29
Pheasant	Through Feb. 1
Bobwhite Quail	Through Feb. 29
Fox	See *Regulations Digest*
Raccoon and Opossum	See *Regulations Digest*
Common Snipe	Through Feb. 28
Ruffed Grouse	Through Feb. 29
Mourning Dove	Dec. 19-Jan. 15
Woodcock	Dec. 18-Jan. 15
Crow	See *Regulations Digest*
Bobcat	See *Regulations Digest*

WATERFOWL

Ducks, Mergansers and Coots	Through Jan. 20
Sea Ducks	Through Jan. 20
Snow and Blue geese	Through March 10
Brant	Through Jan. 20
Swan	Through Jan. 31 (by permit only)

Information on bag limits and other regulations may be found in the *1999-00 North Carolina Inland Fishing, Hunting & Trapping Regulations Digest*. For a copy, check with license agents or contact the N.C. Wildlife Resources Commission at (919) 733-7291. **For more information on waterfowl regulations and limits, call 1-800-675-0263.**

Furbearer Project Leader Recognized



SANDY GRUZESKI AND RHONDA BROWN

Perry Sumner (left) Furbearer Project leader *for the N.C. Wildlife Resources Commission, receives a plaque from Ricky Oliver, president of the N.C. Coon Hunters Association (NCCHA). Sumner was recognized for his continuous assistance to the association.*

On Patrol

Editor's note: *Below is a report that illustrates the humorous, and sometimes out-of-the ordinary, situations our N.C. Wildlife Enforcement officers encounter while on patrol.*

Recently, Sgt. Russell Hunter and officer Kelwin Elliott set up a deer decoy just before dark to see if there were any poachers in the neighborhood. It turns out there was one taker, but not what they expected. Fifteen minutes into their stakeout, a live buck stepped out from the edge of the woods about five yards from the decoy. The buck took one look at the decoy, lowered its head and charged his foam rival, striking it in the side. Not getting a reaction, the buck stepped back, held his head high, then high-stepped around the upright decoy, before freshening a scrape a couple of yards away. Still unable to provoke a fight, the buck attempted to stare down the decoy that was now facing in the other direction. After getting no response from his indifferent intruder, the buck continued high-stepping around the field, stopping occasionally to look back and see if the decoy wanted any more. (The brawling buck was not charged with assault and battery.)

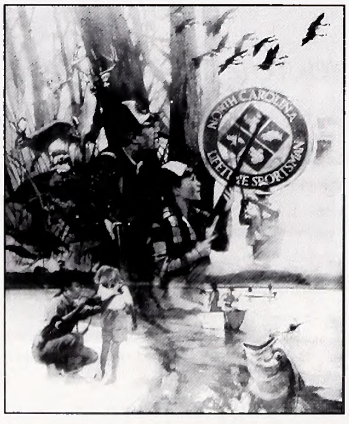
Catch Us at These Numbers

- **1-800-662-7137** to report violations of hunting and fishing laws.
- **1-800-628-3773** (NC VESSEL) for boat registration and titling.
- **1-800-675-0263** for hunting dates and shooting hours for migratory game birds.
- **1-888-248-6834** (2HUNTFISH) to purchase most licenses and *Wildlife in North Carolina* magazine subscriptions with VISA or MasterCard using a touch-tone telephone.
- **1-800-446-8663** (I GOT ONE) to report big game harvests.
- Connect to the Commission's online web site at **http://www.state.nc.us/Wildlife/**

The N.C. Wildlife Resources Commission maintains five toll-free telephone numbers to provide better services and convenient access to information for North Carolina citizens. Calls are answered in order, but some numbers may require a wait during busy seasons.

VISA MasterCard

Wildlife Endowment Fund Report



Totals Through October 1999

Principal Balance
$28,662,205.95

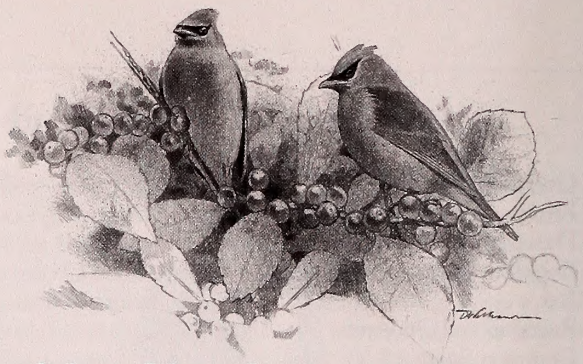
Interest Earned
$29,442,864.57

Total Receipts
$58,105,070.52

Interest Used
$18,100,819.04

Fund Balance
$40,004,251.48

Established on May 29, 1981, this fund is derived from the sale of lifetime hunting and fishing licenses and lifetime subscriptions to *Wildlife in North Carolina* magazine as well as from tax deductible contributions. While the interest may be used to supplement N.C. Wildlife Resources Commission programs, the principal remains invested to generate additional interest for the future.



New Year Improvements

by Rodney Foushee

With the arrival of the new millennium, here are some tips to help fish and wildlife on your property.

Recycling Christmas Trees: Think twice before you drag that Christmas tree to the curb for garbage pickup. Old Christmas trees make wonderful habitat gifts for fish and wildlife as long as they don't end up in the trash pile. The more old trees you can get your hands on, the better!

An excellent way to improve habitat for quail, rabbits and songbirds on your property is to create brush piles with Christmas trees. You can stack several trees together to provide good escape and nesting cover for wildlife. Even a single tree strategically placed near a backyard bird feeder or bath will provide some protection for wintering songbirds.

For aquatic habitat improvement, sink one or more Christmas trees in your favorite farm pond. The dense branches will serve as excellent cover for bass, bream and crappies for seasons to come. Anchor the trees by tying their trunks to cinder blocks. And make sure you mark their location on a small map, so you'll be able to pinpoint the submerged trees for fishing come spring.

If you live along the coast, you can donate your Christmas tree for a sand dune restoration project. Groups of Christmas trees placed on the beach will catch wind-blown sand, ultimately forming new dunes. Check your local newspaper for tree drop-off locations in your area.

Safer Antifreeze: Standard car antifreeze, even in tiny doses, is a lethal poison for wildlife and pets. Because of its sweet taste, animals are attracted to it. To prevent accidental poisonings, make sure you thoroughly clean up any spills from your vehicle and properly dispose of used antifreeze. A safer option is use animal-friendly antifreeze that contains propylene glycol in your vehicle rather than a product containing ethylene glycol. This safer antifreeze is readily available at your local auto supply store.

Martin Homes: With purple martins due to arrive in early March, now is an excellent time to erect houses and gourds for these cavity nesters. Place martin houses in open locations on poles about 15 feet high. Gourds can be attached to a single rope strung between two points. For more information, contact The Purple Martin Conservation Association, (814) 734-4420.

N.C. WILD STORE

RARE HABITATS

water-quality issues

Indian remains

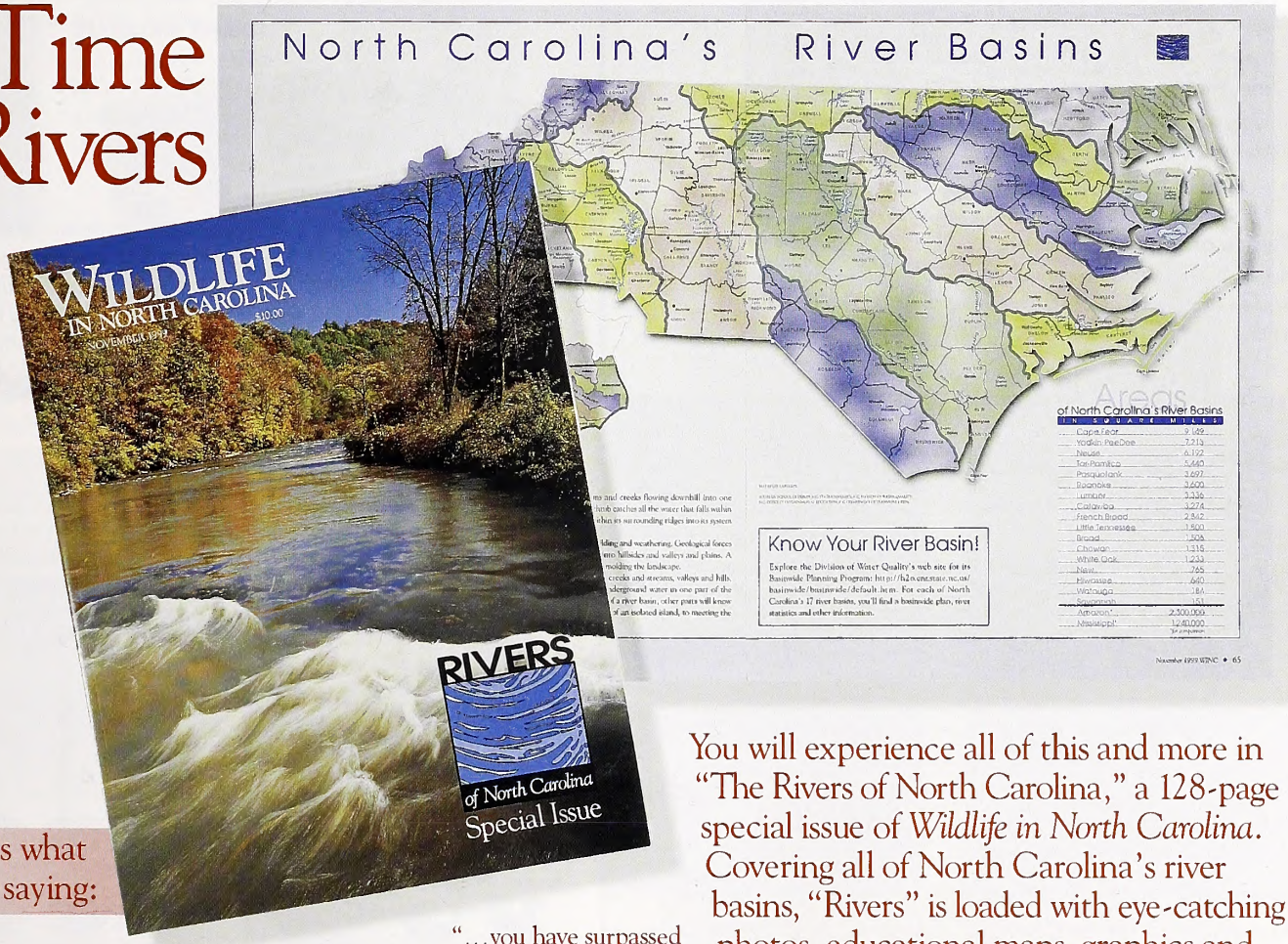
early explorers

the secret life of animals

canoe trips

the real-life stories of people working for our rivers

A Time for Rivers



You will experience all of this and more in "The Rivers of North Carolina," a 128-page special issue of *Wildlife in North Carolina*. Covering all of North Carolina's river basins, "Rivers" is loaded with eye-catching photos, educational maps, graphics and entertaining articles. There's nothing comparable on bookshelves anywhere.

Here's what they're saying:

"...you have surpassed yourself with this issue. The art is not just beautiful but illustrative and informative; the photos and charts and sketches of the river basins are put together with a wonderful sense of composition to enhance the articles. ["Rivers of North Carolina"] is a classic."
—Philip Gerard, author of *Cape Fear Rising*

"With excellent writing, photos and maps, the [special issue] is a beautiful gift to all of us, as well as a wonderful teaching tool for all ages. What a great way to bring in the Year of the Rivers - 2000 celebration!"
—Peg Jones, executive director, North Carolina Watershed Coalition

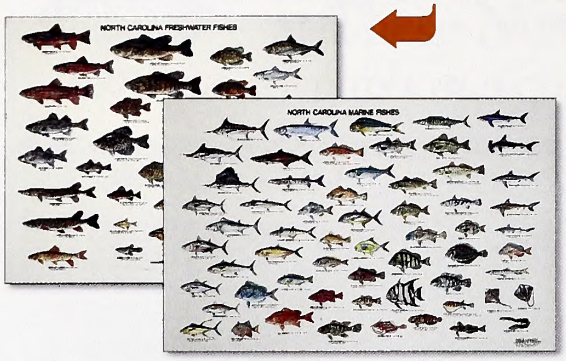
Order "Rivers of North Carolina" today for your own bookshelf, or give it to friends and family members to enjoy. Simply complete the N.C. WILD Store order form following page 40. **$10.**

ITEM CODE **M11**

All proceeds from the sale of these products support the development and production of conservation education projects and programs.

N.C. WILD STORE

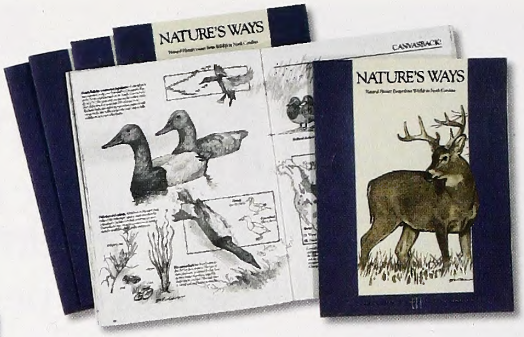
North Carolina's freshwater fish and marine fish are colorfully displayed on individual posters, and feature the art of Duane Raver. Reel yours in today!



Fishes of North Carolina

Set of 2. Freshwater fish poster shows 36 state species (size 28" x 22½"). Marine fish poster shows 60 species (size 35" x 22½") $10.

ITEM CODE **P9**



Nature's Ways Collection

Explore the wonders of the natural world, wildlife species and ecosystems through "Nature's Ways." More than 200 essays from *Wildlife in North Carolina* have been compiled in a beautiful 6-volume paperback set. $27.50.

ITEM CODE **M9**

Also available as a boxed set. $30.

ITEM CODE **M10**

Before going on your next outdoor hike or camping trip, be sure you know North Carolina's reptiles.

Reptiles of North Carolina

Set of 4 posters in full color. Each poster decribes the species and denotes which reptiles are on the endangered, protected or special concern list. A set includes: lizards, turtles, and both live-bearing snakes and egg-laying snakes. Posters are sized 22" x 34". $18. ITEM CODE **P10**

Amphibians of North Carolina

The Hylid Frogs. North Carolina's tree frogs, cricket frogs and chorus frogs, belonging to the large family *Hylidae*, are presented in this colorful poster, one of two frog posters in the Amphibians series. 22" x 34". $6.

ITEM CODE **P11**

Amphibians of North Carolina

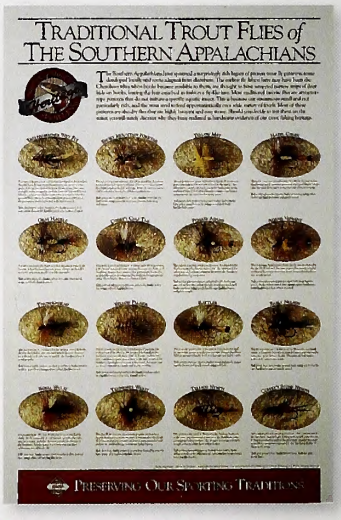
True Frogs and Toads. The second poster in the Amphibians series showcases true frogs and toads. Vibrant photos combine with informative text to make it a standout in the classroom or at home. 22" x 34". $6.

ITEM CODE **P14**

Waterfowl Decoys of N.C.

Nineteen classic waterfowl decoys from North Carolina's legendary days of waterfowl hunting have been collected for the first time on this framable, high-quality poster. This is the first in a series of "Sporting Heritage" posters. 22" x 34". $10.

ITEM CODE **P12**



Traditional Trout Flies of the Southern Appalachians

Sixteen traditional trout flies are presented in stunning color detail. Each fly is accompanied by a brief history of its development and use in Appalachian waters as well as the components that make up each hand-tied creation. Second in a series of "Sporting Heritage" posters. 22" x 34". $10. ITEM CODE **P13**

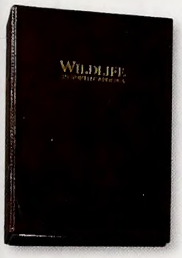
Bird Houses & Feeders: How to Build and Enjoy Them

An eight-page illustrated guide to building bird houses and feeders. $2.

ITEM CODE **M6**

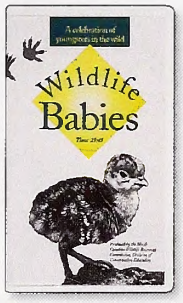
Dogs that Point, Fish that Bite

Here are 50 of the best "Our Natural Heritage" columns written by Jim Dean for *Wildlife in North Carolina* over the past 17 years. Published by the University of North Carolina Press and the N.C. Wildlife Resources Commission. Hardbound. 220 pages. **$19.95.** ITEM CODE **M8**



Magazine Binder

Store 12 issues of *Wildlife in North Carolina* in a sturdy binder. **$10.**
ITEM CODE **M2**



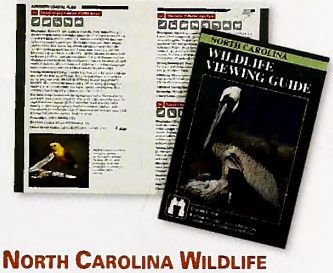
Wildlife Babies Video

Entertaining 25-minute video version of the classic 1965 Jack Dermid film reveals springtime antics of young wood ducks, black bear, possums, cottontails and others . **$20.**
ITEM CODE **N9**

Based on Chief Seattle's 1855 speech, the film's focus is on environmental ethics. Accompanied by This Land Is Sacred, this film is a must-see for everyone. It is destined to become a classic.

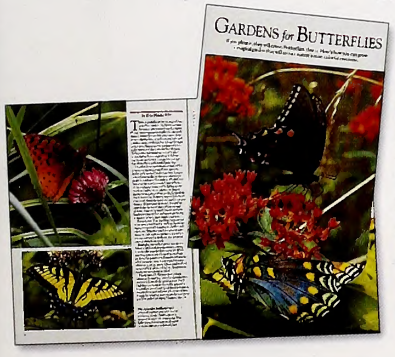
All Things Are Connected

Video and Activity Guide. **$22.**
ITEM CODE **W3**



North Carolina Wildlife Viewing Guide

From Cape Hatteras to the Great Smokies, *North Carolina Wildlife Viewing Guide* will lead you to 90 of the state's premier wildlife viewing locations—and better your chances of seeing wildlife once you get there. **$5.95.** ITEM CODE **N6**



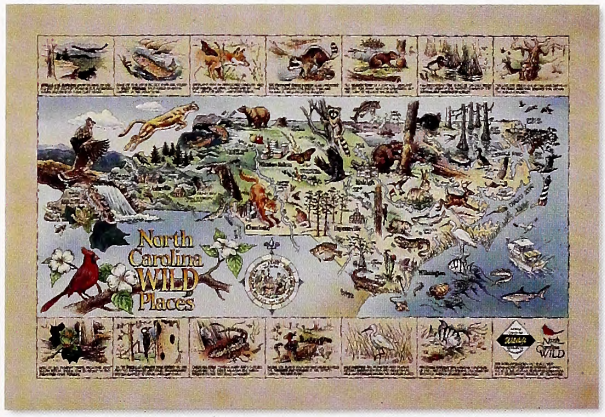
Gardens for Butterflies

Article reprint from *Wildlife in North Carolina* magazine for the gardener who wants to attract some of nature's most colorful creatures. **$2.** ITEM CODE **M5**

Scouting Correlations

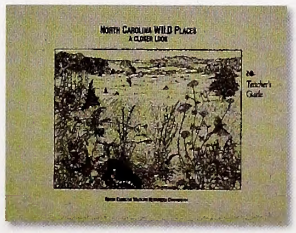
Cub, Boy and Girl Scout requirements are correlated to Project WILD and Aquatic WILD activities. Supplements Scout leaders' planning materials and events. Each **$3.**
Cub & Boy Scout Correlation. ITEM CODE **E9**
Girl Scout Correlation. ITEM CODE **E10**

North Carolina's wildlife habitats come alive in this 82-page, easy-to-read, soft cover book. With delightful illustrations by Anne Marshall Runyon, N.C. WILD Places covers 13 habitats across the state.



North Carolina WILD Places: A Closer Look

Book and Posters Set. With each book you'll receive two habitat posters (also by Runyon) and a N.C. WILD Places Map poster, featuring the art of Jackie Pittman. **$16.** ITEM CODE **E6**



North Carolina WILD Places Teacher's Guide

For teachers using *North Carolina WILD Places* in the classroom, these activities and games will heighten student awareness of wildlife habitats. **$6.**
ITEM CODE **E7**

More terrific items ☛

N.C. WILD STORE

Top-quality, 3-ring binder holds 120 WILDlife Profiles. Custom-made binder comes with a table of contents, tab dividers to organize Profiles by classes, an index and 120 fact sheets.

WILDlife Profiles Binder & WILDlife Profiles Sets 1-12

Binder features clear overlay cover, 1 1/2" capacity and inside literature pockets. See the list of species profiled below. $30. ITEM CODE **W17**

Set 1. Black bear, raccoon, white-tailed deer, striped skunk, bobwhite quail, wild boar, muskrat, mourning dove, coyote, mallard.

Set 2. Mink, canvasback duck, red fox, wild turkey, beaver, American river otter, Canada goose, bobcat, red wolf, cougar.

Set 3. Humpback whale, black duck, osprey, clapper rail, red-shouldered hawk, cottonmouth, diamondback terrapin, largemouth bass, black crappie, channel bass.

Set 4. Brook trout, garden spider, Tar spiny mussel, wood duck, bullfrog, mayfly, tiger salamander, bog turtle, hellbender, shortnose sturgeon.

Set 5. Cottontail rabbit, gray squirrel, northern flying squirrel, newt, common crow, red-tailed hawk, prothonotary warbler, bluegill, striped bass, Eastern oyster.

Set 6. Opossum, peregrine falcon, Eastern bluebird, American toad, rat snake, Eastern glass lizard, smallmouth bass, brown trout, monarch butterfly, Virginia big-eared bat.

Set 7. Chipmunk, gray fox, bald eagle, loggerhead shrike, common snapping turtle, five-lined skink, bluefish, rainbow trout, grasshopper, horseshoe crab.

Set 8. Appalachian cottontail, manatee, barred owl, turkey vulture, Neuse River waterdog, spring peeper, coral snake, American alligator, American eel, American shad.

Set 9. Southern flying squirrel, fox squirrel, great horned owl, snowy egret, Southern leopard frog, corn snake, Atlantic sturgeon, walleye, luna moth, crayfish.

Set 10. Marsh rabbit, woodchuck, hooded warbler, whippoorwill, green salamander, copperhead, fence lizard, muskellunge, chain pickerel, Scotch bonnet.

Set 11. Atlantic croaker, Southern flounder, summer flounder, spot, king mackerel, Spanish mackerel, sea mullet, weakfish, spotted seatrout, striped mullet.

Set 12. Bay scallop, black sea bass, blue crab, brown shrimp, spiny dogfish and smooth dogfish, gag, hard clam, menhaden, sandbar shark, white perch.

INVENTORY BLOWOUT! 50% off when you order Sets 1 through 10 inclusive. $10. ITEM CODE **W4-S**. (Does not apply to purchase of individual sets. Offer expires Dec. 31, 1999.)

Embroidered Caps

North Carolina WILD Cap. N.C. Wild cardinal on brushed-cotton twill cap with a Velcro® closure. Two-tone cap is tan/forest green. $16.50. ITEM CODE **A1**

Wildlife in North Carolina Caps. Exclusive designs and magazine logo are featured on three different cap styles. $16.50 each.

- Brook trout on sage-colored, brushed cotton cap with an unstructured front, extended bill, and nubuck suede closure. ITEM CODE **A3**
- Deer silhouette on Advantage® Camouflage cotton cap with tan suede bill. ITEM CODE **A6**
- Deer silhouette on blaze orange cap with brown waxcloth bill. ITEM CODE **A7**

Pisgah Center for Wildlife Education T-shirt

100% cotton natural color tee with design on back and Pisgah logo on front. $14.50.
ITEM CODES:
A8MED (medium)
A8LRG (large)
A8XLG (extra large)
A8XXL (extra extra large)

New: WEE TEES

Just like the adult shirt with Pisgah design, only smaller.
ITEM CODES:
A9XS (extra small; size 2-4) $10.
A9SM (small; size 6-8) $12.50.
A9MD (medium; size 10-12) $12.50.
A9LG (large; size 14-16) $12.50.

Wildlife in N.C. T-shirt

WINC magazine logo on front pocket. Tundra swan art on back. White. $14.50. ITEM CODES:
A5MED (medium)
A5LRG (large)
A5XLG (extra large)
A5XXL (extra extra large)

N.C. WILD T-shirt

N.C. WILD logo printed on front and colorful art on back. White. $14.50. ITEM CODES:
A4MED (medium)
A4LRG (large)
A4XLG (extra large)
A4XXL (extra extra large)

WILDLIFE COMMISSION SPOTLIGHT

Where *Does* the Bear Cross the Road?

That's what biologists with the N.C. Wildlife Resources Commission are trying to find out before a major four-lane highway is constructed in Washington County.

MELISSA McGAW

The new $176 million U.S. 64 bypass will relieve traffic congestion and allow motorists to reach the Outer Banks more quickly. But the Washington County stretch of the highway, slated for construction in 2002, will also pass through some of the state's best black bear habitat.

Reaching weights in excess of 500 pounds, adult bears can pose a major highway hazard to motorists. Conversely, speedy

MELISSA McGAW

cars and trucks can easily kill or maim bears as well as isolate their populations.

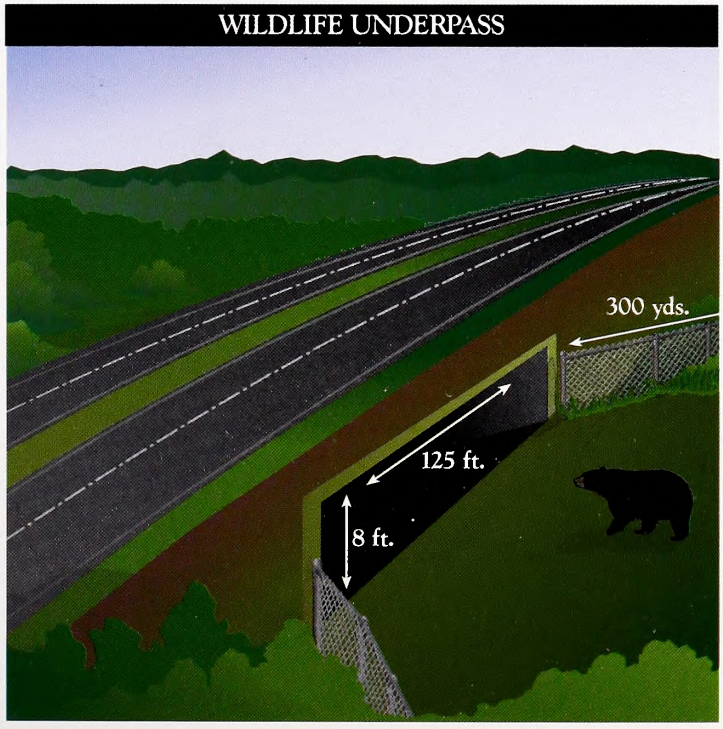
To minimize collisions between vehicles and bears, the Wildlife Commission has teamed up with the N.C. Department of Transportation to place three large wildlife underpasses beneath the U.S. 64 bypass east of Plymouth. Though large wildlife underpasses have never been constructed in North Carolina, similar structures have been used successfully in Florida to reduce highway collisions with endangered Florida panthers and black bears.

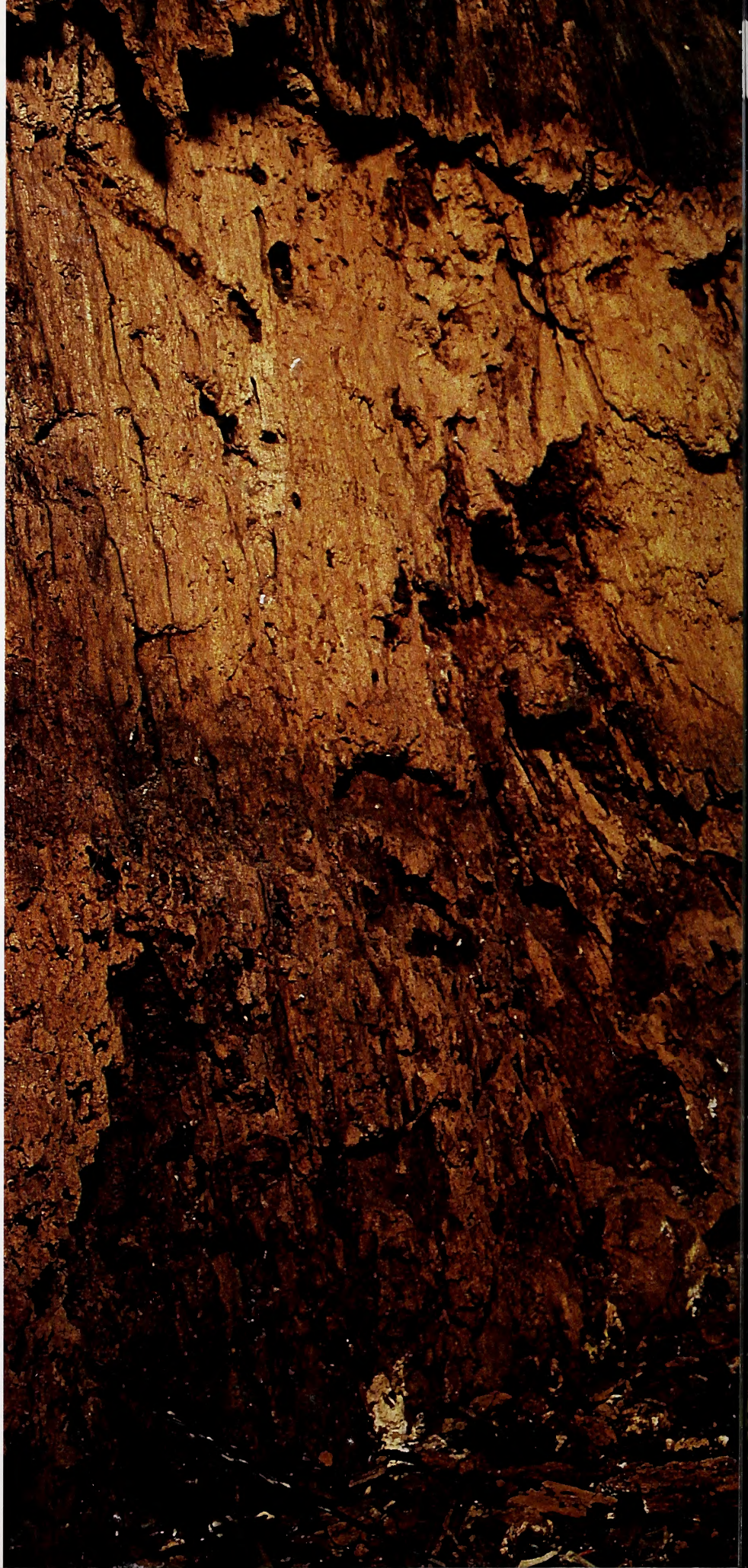
Over the past year, biologists with the Wildlife Commission have studied bear movements in Washington County using remotely activated cameras and track surveys to determine natural game trails used by bears. This data will be compared with landscape maps to identify the best locations for the new underpasses.

Each underpass will be 8 feet high and 125 feet wide, with a naturally vegetated and soil floor underneath. In fact, each wildlife underpass can be considered a highway overpass since the road is actually elevated above ground level on an earthen berm. Fencing will be installed along the highway on both sides of the underpass for several hundred yards to funnel bears and other wildlife to the safe passage under the roadway.

Paid for by DOT for $900,000 apiece, the underpasses are not cheap. But once in place, they will allow motorists to safely travel the new highway, and bears, deer and other wildlife to move freely. Now that's not a bad deal.

GRAPHIC BY VICKIE CUMBEE





Hoo's That?

Huddled high up in a tree cavity, these weeks-old barred owls peer curiously at the photographer. Holes in trees are critical to the nesting success of many bird species. See story on page 18.

Periodicals postage paid at
Hickory, North Carolina

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WILDLIFE IN NORTH CAROLINA

FEBRUARY 2000 $1.50

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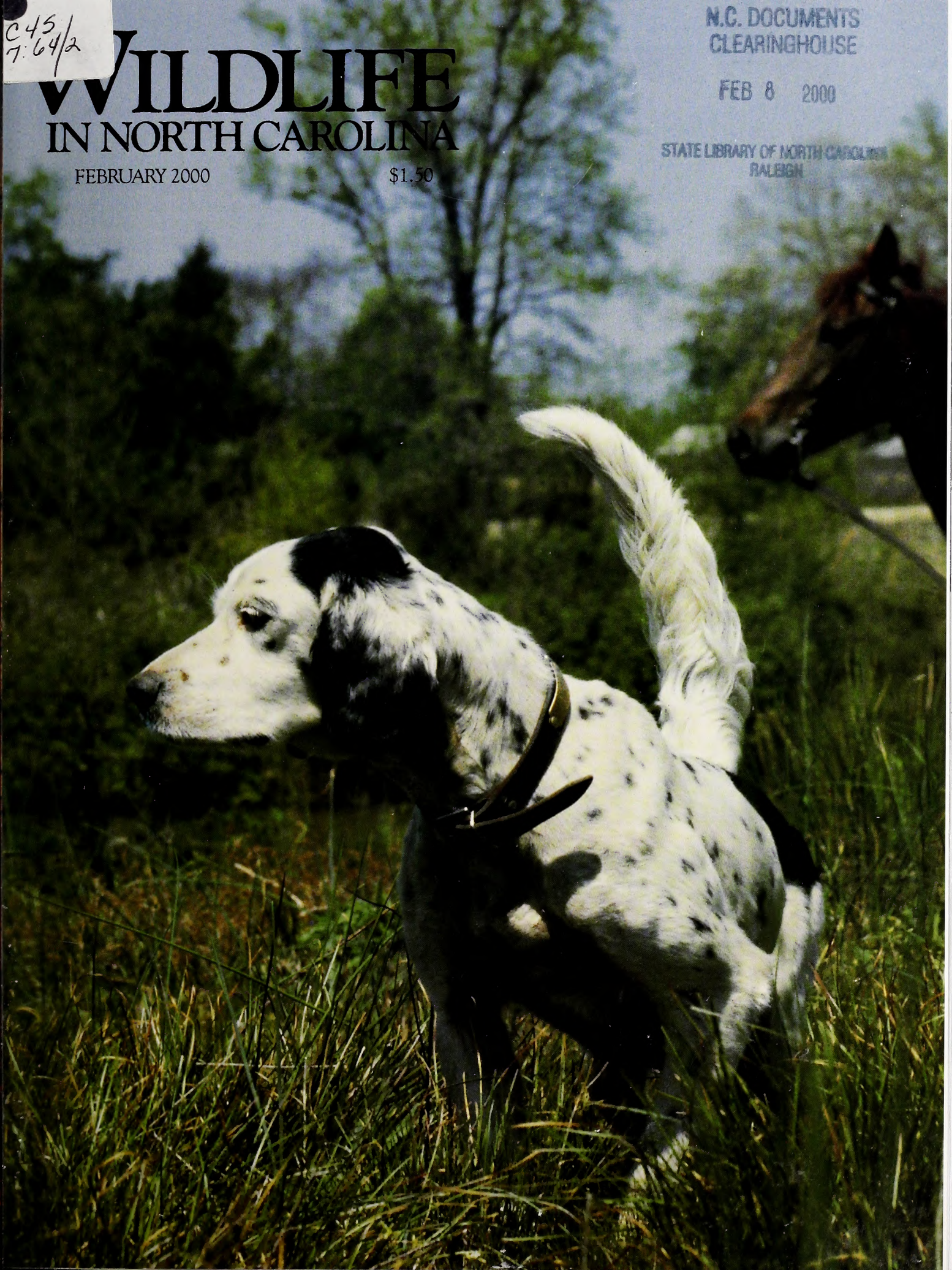

The Incompleat Sportsman

by Jim Dean ©2000

"Which shotgun did you bring?" I asked. It was an innocent question, conversational stuffing tossed out casually as we neared the end of our four-hour trip to the coast where we planned to spend the next two days hunting ducks. The truck was full of hurriedly-loaded gear, including four dozen decoys. I was simply curious to know whether my companion had brought his handsome old Winchester Model 12 pump, or a more modern scattergun. My question was met with uncharacteristic silence.

JIM DEAN

"You didn't sell your Model 12, did you?" I added after a few moments, thinking perhaps he hadn't heard me.

"Nope, didn't do that," he finally replied. "But I didn't bring it, either. Can you believe it? I forgot to bring a shotgun. Nothing. Zilch. Dadgummit, I've had the feeling I'd forgotten something ever since we left."

"Are you sure?" I asked. "Let's pull over and look."

"Don't need to," he said disconsolately. "Both my duck guns are on the kitchen table at home. That's what I went back inside to get, but I stopped in the bathroom and never thought about them again until now."

Among the seemingly inescapable natural forces that govern our existence is the Rule of Disremembrance. This involves more than the occasional temporary lapse of memory, or that curious business of having to go back to the exact spot where you first thought to do something before you can recall what it was. We expect to forget things once in awhile, but the Rule of Disremembrance is no simple aggravation like a runny nose. It's more like mutated influenza—relentless, malevolent with some particularly persistent and nasty adaptations. It dictates, for example, that if the forgotten item is minor, you will remember it while there is still time to backtrack and retrieve it. But if the item is absolutely essential, you aren't likely to recall what it is until it is actually needed, and certainly not until you are so far away as to render recovery impractical.

Over the years, the list of items I've forgotten at one time or another pretty closely matches the list of things I own. Yet, afflicted memory teaches us what is truly essential. It's tough to wade an icy trout stream without wading shoes, but it's certainly feasible to get along a week or so without underwear. A shaving kit left behind is by no means as inconvenient as discovering that you are bereft of bug dope on a blackwater river in May.

"...afflicted memory teaches us what is truly essential. It's tough to wade an icy trout stream without wading shoes, but it's certainly feasible to get along a week or so without underwear."

There is, however, at least a partial remedy. Some years ago, I began to make trip checklists to refer to while packing. Mine have been altered and expanded over the years, and I now keep them on my computer where I can quickly add or drop items and run off new copies. I date each revision so I don't confuse it with an older list I might have neglected to toss out. You may find you need only one list, but I've found it useful to have sub-categories tailored to specific types of trips or places I visit regularly. For example, in addition to a general checklist that covers items I need on most trips, I have sub-lists for camping, fly-fishing for trout, surf fishing, duck hunting and visits to the family farm and my mountain cabin. I even have a list of cooking gear and basic foods and condiments. Because my forgetfulness has epic tendencies, the whole thing now runs a staggering five pages, but it still takes me only a few minutes to review it and see what I've overlooked.

You can argue that reliance on checklists is an illness in itself, a substitute for active thought. And even though checklists are helpful, they can't entirely forestall the most malicious forms of disremembrance.

About 10 years ago, my son, Scott, and I had a rare opportunity to spend a fall weekend surf fishing. We had planned the trip for weeks. We were approximately halfway to our destination when the nagging fear that I had forgotten something took a particularly bizarre twist. We had plenty of rods, but I'd left all of the reels in a bag in the basement! I was suddenly certain of it. I was about to tell Scott about this development when a truck pulling a loaded peanut wagon ran a stop sign directly in front of us. We skidded into the intersection, narrowly missing the truck, and plowed into the rear of the wagon. We were all right, but our radiator was crushed, the battery was in three pieces and the hood peeled back halfway to the windshield.

It would have been a real disaster if I'd had to tell Scott about those reels.

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Wildlife in North Carolina (ISSN 0043-549X) is published monthly by the North Carolina Wildlife Resources Commission, 512 N. Salisbury St., Raleigh, N.C. 27604-1188. Periodicals postage paid at Raleigh, N.C. and additional mailing offices. Subscription rates: one year $7.50, three years $20, lifetime $100. All foreign subscriptions are $23.50 per year. For subscriptions from foreign countries, payment **only** by U S Postal Service money order or cashier's check drawn on a U.S. bank. All orders must be prepaid. Please allow 6 to 8 weeks delivery on new subscriptions and address changes. **POSTMASTER:** Send address changes to Circulation Manager, 1711 Mail Service Center, Raleigh, N.C. 27699-1711. Address all correspondence regarding subscriptions to Circulation Manager. If you have a problem with your subscription, dial (919) 662-4377. Articles in *Wildlife in North Carolina* may represent the personal views of authors, and do not imply endorsement by the North Carolina Wildlife Resources Commission. *Wildlife in North Carolina* is available on audio cassette as a courtesy of volunteer services of the Department of Cultural Resources, Library for the Blind and Physically Handicapped, Raleigh, N.C., (919) 733-4376. **The N.C. Wildlife Resources Commission is an equal opportunity agency.**

A Wing and a Prayer

written by Jeff Beane ©2000
illustrated by David Williams

Have you ever had an insect look back over its shoulder at you? If so, it was a praying mantis—the only insect capable of doing that. Most North Carolinians are familiar with mantises (or mantids—either is correct)—large, impressive-looking insects that appear to be "praying" when they are actually "preying."

The name "mantis" is derived from a Greek word meaning a prophet or seer. Mantises figure prominently in some religions, and many myths center around them. In the rural South, they were once regarded with fear and superstition, and referred to by such colorful names as "devil's horses," "rear-horses," "devil's coachmen," or "mule killers." Today, most people recognize mantises as interesting, "beneficial" creatures, harmful only to other insects, which they seize in their strong, spiny forelimbs and devour with voracious appetites.

But what many people do not realize is that the mantis they are probably most familiar with is an introduced species—the Chinese mantis (*Tenodera aridifolia sinensis*). This large, green-and-brown species now occurs throughout North Carolina and is by far our most common mantis.

What even fewer people realize is that North Carolina has two native mantid species—the Carolina mantis (*Stagmomantis carolina*), and the Brunner's, or walkingstick, mantis (*Brunneria borealis*). Of the two, the Carolina mantis is more commonly encountered, and ranges statewide. It is grayish-brown or green, often mottled with a pattern resembling tree bark, and is about half the size of the Chinese mantis. It is South Carolina's official state insect.

The walkingstick mantis is less familiar, but in some ways more interesting. Long and exceedingly slender, it resembles a walkingstick almost as much as a mantid. It is usually pale green or occasionally straw-colored, with a narrow orange stripe, bordered on either side by a yellow stripe, running down the dorsal surface of its abdomen. It has small, stubby wings, and cannot fly. Most interesting of all is the fact that it is parthenogenetic—only females are known, and the eggs develop without requiring fertilization by a male. Walkingstick mantids occur primarily in our south-eastern Coastal Plain and Sandhills, but have been found at least as far northwest as Wake County.

Two other introduced mantids have been reported from North Carolina—the European mantis (*Mantis religiosa*), which is usually green and slightly larger than the Carolina mantis, and the narrow-winged mantis (*Tenodera angustipennis*), which more closely resembles the common Chinese species. Apparently neither has gained much of a foothold in our state, most often turning up in greenhouse plants brought from the northern United States.

Mantises are widely introduced in the belief that their appetite for other insects is a glorious thing. Gardeners still purchase the foam-like egg clusters (properly called *oothecae*) from horticultural supply companies and reverently place them in their yards and flower gardens, anxious for the mantises to rid their properties of "harmful" insects. In fact, there is no real evidence that Chinese mantises are economically beneficial (except perhaps to the garden centers that sell their egg cases). Their appetite for other insects is very real, but many of the creatures they eat are not "pests"—agricultural or otherwise. Some are, but others (bees, flies, moths), are pollinators, are aesthetically pleasing (butterflies), are themselves efficient insect predators (spiders, dragonflies, lacewings, certain beetles), or are "neutral" from an economic standpoint. Much of a mantid's diet consists of grasshoppers and crickets, which are seldom serious pests. Undoubtedly, Chinese mantises eat and compete with our native mantids. They also eat each other—a habit limiting their density in any garden.

Of all insect species, only a tiny percentage affect humans negatively, and many of those we brought to this country ourselves. Whenever any exotic species is introduced into an ecosystem, something or somebody has to foot the bill. This is a lesson we still have not learned. Instead of seeking fixes for things not broken, we need to look back over our own shoulder, realize past mistakes and respect the integrity of Nature's often delicate balance.

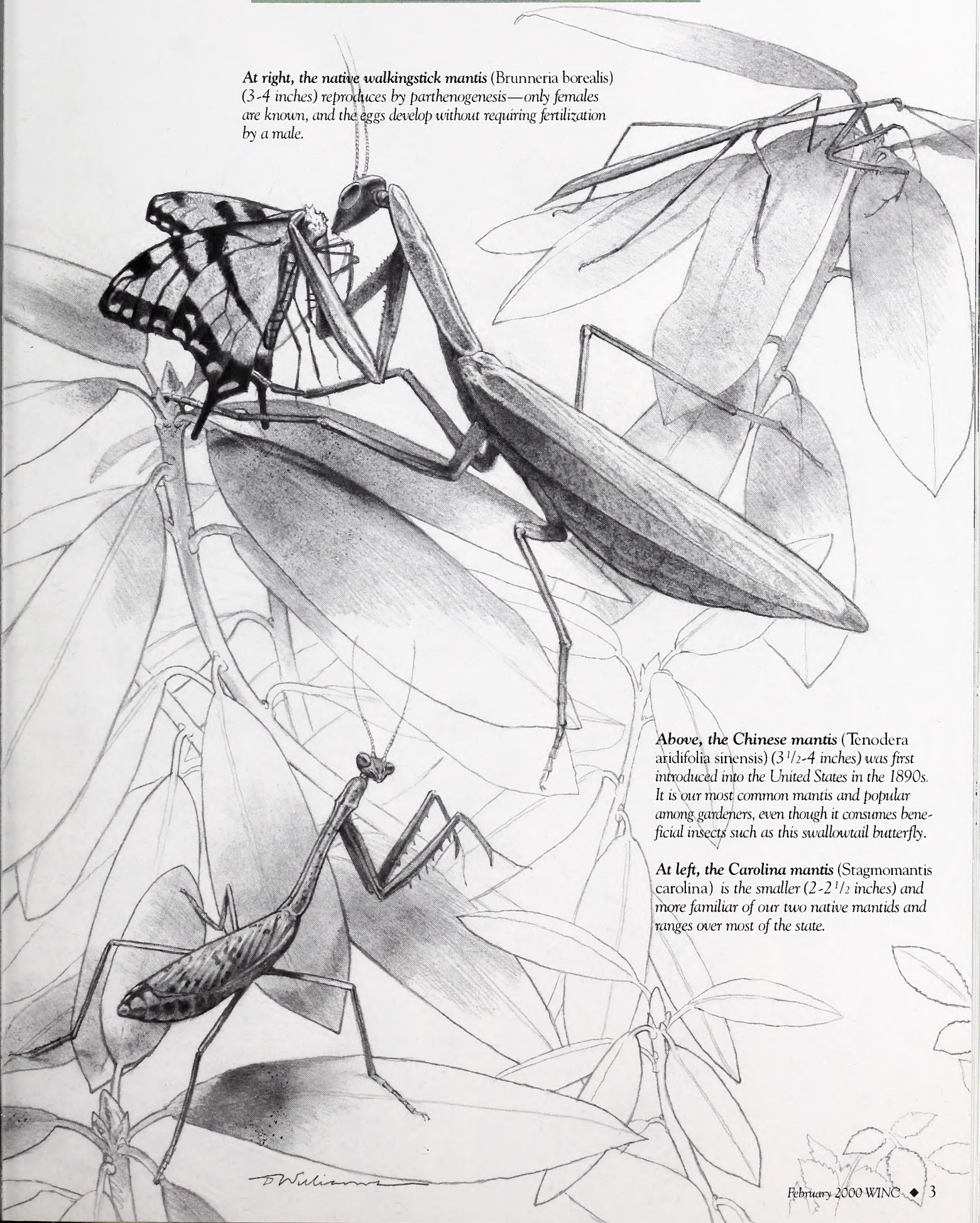
Jeff Beane is a curator of reptiles and amphibians at the N.C. State Museum of Natural Sciences in Raleigh.

Other Reading:

- Earley, Lawrence S. , "Nature's Ways: Love at First Bite," *Wildlife in North Carolina* (August 1989).
- Ellis, Harry, "Murder on a Stick," *Wildlife in North Carolina* (August 1993).
- Gurney, Ashley B., "Praying Mantids of the United States, Native and Introduced," *Annual Report of the Smithsonian Institution* (1950).
- Ross, Edward S., "Mantids: The Praying Predators," *National Geographic* (February 1984).

Surfing the Web

- These web sites contain general information on mantises. *Address:* http://www.cnr.berkeley.edu/explore/Taxa/Dictyoptera/Dictyoptera2.htm Address: http://ctr.uvm.edu/ctr/el/el43.htm
- Visit this web site to see a photograph of the walkingstick mantis (Brunneria borealis). *Address:* http://www.geocities.com/Heartland/Park/2638/Bborealis.JPG
- See this web site for photos of the Carolina mantis (*Stagmomantis carolina*). *Address:* http://ianrwww.unl.edu/ianr/entomol/images/beneficials/mantids/bene_mantids.htm



At right, the native walkingstick mantis (Brunneria borealis) *(3-4 inches) reproduces by parthenogenesis—only females are known, and the eggs develop without requiring fertilization by a male.*

Above, the Chinese mantis (Tenodera aridifolia sinensis) *(3 1/2-4 inches) was first introduced into the United States in the 1890s. It is our most common mantis and popular among gardeners, even though it consumes beneficial insects such as this swallowtail butterfly.*

At left, the Carolina mantis (Stagmomantis carolina) *is the smaller (2-2 1/2 inches) and more familiar of our two native mantids and ranges over most of the state.*

To The Point!

A dash of thrills, a pinch of Old South gentility—it's a combination that's making pointing dog trials flourish today, more accessibly than ever.

written and photographed by Mike Gaddis ©2000

In October of 1874, a fervent retinue of Tennesseans assembled near Memphis to conduct the nation's first field trial for pointing dogs. Six years later, Tar Heel sportsmen eagerly followed suit, hosting the all-age stake of the Eastern trials near High Point.

The Old North State rapidly became a mecca for pointing dog rivalry. Some of the most celebrated dogs in trialing history debuted on North Carolina soil. Count Gladstone IV, fountainhead of a major setter family, began his career at Lexington, winning the inaugural National Championship in 1896. Rip Rap, progenitor of an emerging pointer dynasty, appeared for the first time in an Eastern derby stake at High Point in 1889. In 1915, Mary Montrose, the first triple winner of the National Championship, received her puppy schooling near the town of Barber.

In the half-century between 1880 and 1930, sportsmen and pointing dog fanciers flocked to the fallow fields and broken, piney woods of the Piedmont, foothills and lower Coastal Plain, fired by the promise of abundant quail, fine sport and keen competition. Bobwhites and elite pointing dog trials pumped a lot of welcome dollars into a ragged rural economy, and bird hunting became as regular to daily being as stove-side chairs at a country store.

But with wild bird hunts sounding a death rattle in many areas of the state, much of that legacy has been lost. Still, there have remained among us those who cherish the gentility and superb dog work that hark back to a simpler time of refined pleasures.

That heritage of champion pedigrees has persisted as one of North Carolina's greatest traditions, flourishing virtually every weekend from September to April. If the depletion of quail-hunting opportunities has you down, yet your heart still quivers when a dog slaps into point, you'll find solace and excitement in these time-honored events.

Competition is more diversified than ever, and there's a niche for anyone who has the yearning. The sport can be taken to any level, from back-pasture, bird-hunter stakes to the national championships.

Some of the most prestigious horseback trials in the nation, including the N.C. Open Shooting Dog Championship, U.S. Shooting Dog Futurity and N.C. Open Championship, are contested each season at the J. Robert Gordon Sandhills Field Trial Area at Hoffman. The Gordon Area showcases the collaboration between the N.C. Wildlife Resources Commission and the N.C. Field Trial Association. For the walking trial enthusiast, the Oak Grove venue near Pollocksville, courtesy of the U.S. Marine Corps, is outstanding—recently hosting the Complete Shooting Dog Association's 1998 National Championship.

All of these competitions are open to dog owners and spectators alike. If you're new to the sport or just curious, here's a rundown of what you can expect.

Types of Trials

A pointing dog trial is basically a competitive bird hunt in which the main emphasis is placed upon the performance of the dogs rather than shooting. A field trial seeks the supreme canine performance in a given event, which is rarely determined purely by the number of birds found or points.

Pointing dog trials are contested on either wild quail or released, pen-raised quail, or a combination of the two. Today, except for

Britt's Bud Lite *(facing page) is currently the reigning champion of the United States Complete Shooting Dog Association circuit. The lemon and white pointer is owned by Sammy and Nida Giddens, of Cary. With the right training, these two youngsters (shown right) may one day also have the confident stride of a champ.*

To The Point!

***A large part of field trials** is simply an opportunity to spend a glorious day afield. During horseback stakes, participants and spectators alike can saddle their mounts for a bird's-eye view of superb dog work.*

select regional and national events, most trials are conducted with released birds. By mode of travel, trials are divided into two distinct categories: those in which handlers proceed on foot to run or "handle" the dogs around the course, or those in which the dogs are handled from horseback. In most trials, birds are not killed; rather, a salutary blank is fired upon the flush. A notable exception occurs under the auspices of the National Shoot-To-Retrieve Association (NSTRA), where retrieving ability is also under judgment.

Field Trial Clubs

Field trials are conducted by field-trial clubs (often member clubs of the North Carolina Field Trial Association) which determine the date, grounds, judges and order in which the dogs will be run.

Each club chooses the type of trial it will run and seeks the blessing of the corresponding national sanctioning body, which— in addition to trophies or awards the club may offer—may also provide win certificates for the permanent field-trials record. For horseback trials, the American Field or the Amateur Field Trial Association of America is the primary sanctioning entity. For walking trials, it is largely the Field Trial Association, the United States Complete Shooting Dog Association (USCSDA), the National Bird Hunters Association (NBHA), or the NSTRA. All are well represented in North Carolina.

Every trial has a designated chairperson, who advertises the trial, accepts entries prior to the running and oversees the random drawing that pairs the canine competitors into braces. A brace consists of two opposing dogs.

Within each trial, several individual events, or "stakes," will be contested. A stake in which 20 dogs are entered will consist of 10 braces. Generally, pointing dog trials consist of puppy, derby and shooting dog stakes—differentiated by either or both the age of the dog and its performance. Stakes are designated as amateur or open, not for dogs, but for handlers. A professional handler, who trains for a fee, may run dogs only in open stakes. Amateur handlers can go either way, pitting themselves against the pros if they like, and some do it very successfully.

All-age stakes are specialty events that emphasize ground coverage or "range" over which dogs are expected to hunt, their main contrast with shooting-dog stakes.

Classics and championships are premier, prestige stakes, requiring prerequisite wins for entry and rewarding only exemplary performance.

On The Ground

Beneath the larger venue of sanctioned stakes is a small circuit of local, back-pasture "bird-hunter" trials, "fun trials" in which judging standards are relaxed to more closely approximate everyday gunning expectations.

With competition in progress, the various stakes are run in the order advertised, brace by brace. The basic field-trial party for a given brace and its order of travel over the grounds includes two dogs, their handlers, two judges, a gallery of spectators and a marshall, who maintains gallery order and keeps things moving. Each brace is "down," or hunting the course, for a standard period of time: 20 minutes for puppies, 30 minutes for derby and shooting-dog stakes.

Here's what the judges look for:

Puppy Stakes. Puppies under one year of age are judged solely for their expression of the desirable, instinctive traits and natural abilities that, given proper training, should make an exceptional shooting dog once the animal matures.

Derby Stakes. Dogs under 2 years of age are judged for assertion of desirable innate traits plus their ability to successfully absorb fundamental training. They are not expected to display finished manners but are expected to hunt ambitiously and establish a definitive point in the presence of game. As the trial season and training progress, greater expectation is placed on holding a point and an inclination to steadiness when the bird is flushed and the shot is fired. A derby that runs and hunts with exuberance and style and points game decisively is highly esteemed.

Shooting Dog Stakes. In this category, a contender must have inspired ground coverage, elegance of motion and an unquenchable desire to find birds. Addi-

tionally, shooting dogs must exhibit finished manners on game, including:

•steadiness (upon establishing a point, the dog must maintain its position throughout the flush and shot)

•stopping to flush (halting in place to mark the incidental flight of a bird)

•backing ("honoring") a pointing bracemate.

All of these must be performed with scintillating character and intensity.

Once all braces have run, a stake is completed. The judges render their decision, and the trial chairman announces the winners. Normally, first, second and third places are awarded. Amateur stakes bestow trophies, ribbons or gifts to handlers; open stakes grant monetary awards—a percentage of entry fees. Handlers and/or owners subsequently receive win certificates from the sanctioning body. Sanctioned wins in derby and shooting dog stakes are recorded as permanent records in the American Field Stud Book, maintained by the American Field Publishing Company.

When all stakes have been run, the trial is concluded. Most smaller trials require one to three days for completion; major events may run a week or more.

These dog owners *show off medals won during a field trial. Field-trial clubs conduct the events, determining the date, grounds, judges and order in which the dogs will be run.*

Seven Crucial Steps

1. The time-honored and virtually exclusive compendium for upcoming pointing-dog trials is the *American Field*, a weekly newspaper published by the American Field Publishing Company, 542 South Dearborn St., Chicago, Ill. 60605. The publication includes trial reports and general interest features on pointing dogs, training, trials and trialing folk. To gain specific information on an individual trial or enter a dog, call the trial

To The Point!

chairperson listed in the ad.

2. Concentrate initially on smaller trials that offer sanctioned, amateur puppy, derby and shooting dog stakes. Give yourself some acclimation time before attempting all-age stakes, classics or championships, which are beyond the station of a beginner. By all means, however, go to some of these events as a spectator. You'll see class dog work that will stretch your imagination.

3. Attend your first trial as a member of the gallery. If you favor horses and riding, take in a horseback trial. If your preference is walking trials, choose a foot-handled event. Look, listen and learn. Study the lay of the grounds, the performance of the dogs in each stake, handling strategy and what appears to be a winning combination. At the lunch break, introduce yourself to a handler whom you find impressive and ask a polite number of questions. It's a little intimidating at first, but push past the trepidation. Do the same with other members of the field-trial party. You'll find people eager to help, and return home exhilarated and ready to field a dog.

4. Secure training grounds. Lack of suitable training grounds is, increasingly, the foremost limiting factor to newcomers interested in trial participation. It takes a fair amount of property to develop a trial dog. At a minimum, something on the order of 300 acres is needed for a foot dog and 500 or more for a horseback contender. Ideally, the territory should be largely open and lightly fenced, with plenty of field edge and hedgerows, amid broken woodland.

You may have to scratch around a bit to find an available tract, but where there's a will, there's a way. If you're dead-ended, seek out an active surveyor who works throughout your county. Explain your needs and ask him if he can give you some leads. Then talk diplomatically to the landowners, telling them specifically how you would hope to use and protect their land.

5. Evaluate your dog power. If you currently have a pointing dog, it may or may not be successful in trials. Realize that the demands of an everyday bird hunt and the judging standards for a field trial are a province apart. A dog that seldom hunts beyond shotgun range will not win field

Field trials, *in a sense, have extended the shelf life of quail hunting, which has become somewhat of a lost art in North Carolina. Through these events, participants and spectators can still feel that tinge of excitement when a dog locks into a point on a covey of quail.*

KEN TAYLOR

trials. A dog that hunts up and points every bird in the woods, but in a lackluster, mechanical fashion will not win field trials. A dog unsteady to wing and shot in a shooting dog stake will not place, no matter how pleasing its residual attributes, and can also disadvantage competitors.

Again, field trials celebrate a canine performance that is bold, merry, productive, mannered and, above all, thrilling.

If you have a dog that has the stuff, give it a chance; both of you will enjoy and profit from the experience and gradually forge a winning effort. If not, it will be best to seek another, more encouraging prospect. Breedwise, an English pointer or setter will offer the greatest opportunity for success.

6. Train to win. Don't let your standards flag. Your goal is to develop a solid contender with all its natural drive and enthusiasm intact. Polish, polish, polish! If you find yourself stymied, seek the services of a good professional trainer. As an amateur, you can run your professionally trained dog in either open or amateur stakes.

7. Enter your first trial. Go as an earnest competitor, with an intent to win, but enjoy yourself. Push past the nerves. As with all sports, there're some dues to be paid. With each successive trial, you and your dog will gain poise. If not initially, soon you'll win a placement, and the world of pointing dogs will broaden into a universe.

One of the best ways to break into trialing is with a promising puppy. Running a puppy is an enjoyable occasion for everyone, absent much of the pressure that will come to bear in advanced stakes.

A puppy with winning potential should be well made, and it should be fast and happy, with a high, cracking tail over a bouncy, fluid gait. It should range ambitiously forward, demonstrate a pleasing inclination to hunt and be reasonably biddable to your beckoning. The more exceptional these qualities, the greater the pup's potential.

With a good puppy, you can immediately know the thrill of competition, learn the ropes as you go and groom your dog progressively for derby and shooting dog contests.

After you've gradually worked into the higher stakes, there'll be a day and a moment, 58 minutes into an indescribable hour, when you top the high crest of a hill. Behind will be an entourage of followers, excited and anxiously pressing to catch the concluding minutes of a gallant performance. Ahead will stretch rolling headlands of yellow, and at their distant center will stand your dog, lofty and tight on a wild plum edge. Your heart will lock in your throat, and you'll whisper a brief, silent prayer. With a noble turn, you'll doff your hat and proudly declare to the world: "POINT!" ⊠

North Carolina Field Trial Schedule

HORSEBACK STAKES

The following horseback stakes will be held at the J. Robert Gordon Sandhills Field Trial Area at Hoffman in Richmond County:

NCTFA Shooting Dog Championship	Feb. 2-6
Tar Heel Amateur All-Age	Feb. 11-13
Spring Valley	Feb. 24-28
N.C. Open Derby and All-Age	Mar. 4-8
N.C. Quail All-Age Championship	Mar. 9-12
Carolina Lean Breed	Mar. 17-19
Southern Pines Classic	Mar. 23-26

For more information, call the field trial facility at (910) 895-9175 or 381-3917.

WALKING STAKES

National Bird Hunters Association

N.C. State Classic	Feb. 25-27	Linden	Contact: Beth Walker (919) 894-1401

U.S. Complete Shooting Dog Association

Yadkin Point	Feb. 4-6	Yadkin Point	Contact: Bob Cook (336) 751-2624
National Championship	Feb. 17-20	Mebane	Contact: Mike Hester (336) 578-4181
Slick Rock	Mar. 24-26	Slick Rock	Contact: Robert Bridgers (919) 284-5433

See *The American Field* for a more comprehensive listing, including NSTRA events and convenient trials in South Carolina and Virginia.

Hardluck **Terrapin**

The sweet-tasting diamondback terrapin has had more than its share of adversity. The unique turtle limps into the new century with its future still clouded.

written by Phil Spivey ©2000

Several years ago, while walking along the marshy shore of North Rock Island, off the southern tip of Ocracoke Island, I noticed a scraggly-looking crab pot half submerged in the water and totally encrusted with barnacles and leafy algae. I was there to census a wading-bird rookery on the island with Dr. Jim Parnell, former biology professor at the University of North Carolina at Wilmington. Out of curiosity, I rolled the pot over and found the shells of five dead and decomposing turtles. They were diamondback terrapins (*Malaclemys terrapin*).

I dumped the contents into the marsh. The stench was considerable, but the intricate hexagonal patterns of orange and yellow scribbled on the shells sparkled in the sunlight. I was fascinated. Some of the shells were jet black or olive green, although others were more colorful, but Dr. Parnell assured me they were all diamondback terrapins. These turtles can show a marvelous array of color patterns, not only in their shells but in their skin coloration, too. Some have grayish or turquoise skin with blotches, spots, flecks or even stripes of black. Their variation is so pronounced, you'd think they belonged to different species.

My first encounter with the diamondback terrapin sparked my scientific interest in this unique species, and my concern as well, for the turtle is listed as a species of special concern in North Carolina. Entrapment in discarded crab pots is only one of the threats endangering it. Coastal development is a more serious threat, especially the numerous roads that traverse our coastline. In most of North Carolina, the terrapin has been nearly extirpated, surviving only in remote marshes far away from the hum of tourist traffic, jet skis and the voices emanating from beachfront condos, go-cart

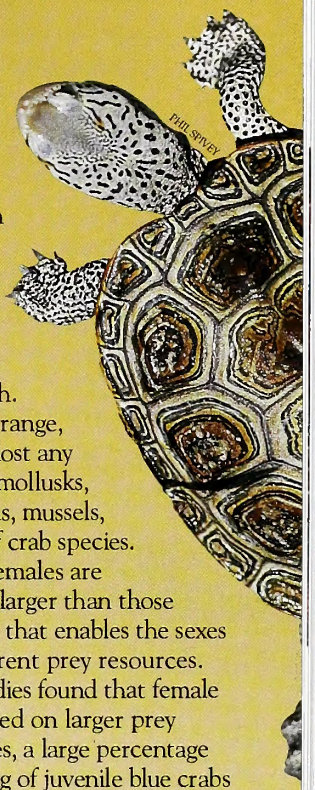
KEN TAYLOR

tracks and water slides. Fortunately, in some areas diamondback terrapins are still quite common, crowding onto exposed mud banks in early spring to socialize and gather warmth.

From 1995 through 1997, I spent the warmer months studying the natural history of the diamondback terrapins living in the marshes of Core Sound, immediately north of Cape Lookout. I was introduced to this study area by Tom Henson, then the Coastal Project leader for the state's Nongame and Endangered Wildlife Program. Tom already had discovered an area that seemed to support much higher densities of terrapins than any of the surrounding marshes. He wanted to know why this habitat was so special. By attaching radio transmitters onto the carapaces of terrapins, I was able to track their movements and discover many other aspects of their natural history.

The diamondback terrapin is a member of the turtle family Emydidae, which also includes most other freshwater aquatic turtles of North Carolina, but this species is different—really different. In fact, no other turtle in North America fills the same ecological niche. Diamondback terrapins are brackish-water inhabitants, living in the estuarine systems at the confluence of freshwater rivers and ocean waters. This was a place left vacant through thousands of years of evolution until the emergence of the diamondback terrapin. The fact that no other Emydid turtle made use of this amazingly productive habitat has puzzled herpetologists for many years. There are seven subspecies of diamondback terrapins stretching from Cape Cod all the way to the Gulf Coast of Texas, further evidence that this species had ample time to explore and differentiate into large areas of coastal habitat without significant competition from other turtle species.

The genus name *Malaclemys*, like many scientific names, hints at an aspect of this species's natural history. The Latin prefix *mala* refers to mollusks and *clemys* to turtles, so *Malaclemys* literally indicates a "mollusk turtle." Obviously, the diamondback terrapin doesn't look like a mollusk or even act like one, but mollusks make up a large percentage of the terrapin's diet, at least in some places. Like their closest relatives, the map turtles (genus *Graptemys*), female diamondback terrapins are considerably larger than males. In North Carolina, an average adult male may weigh half a pound and be 4 to 5 inches long, while females weigh more than 2 pounds and measure 8 to 10 inches in length.



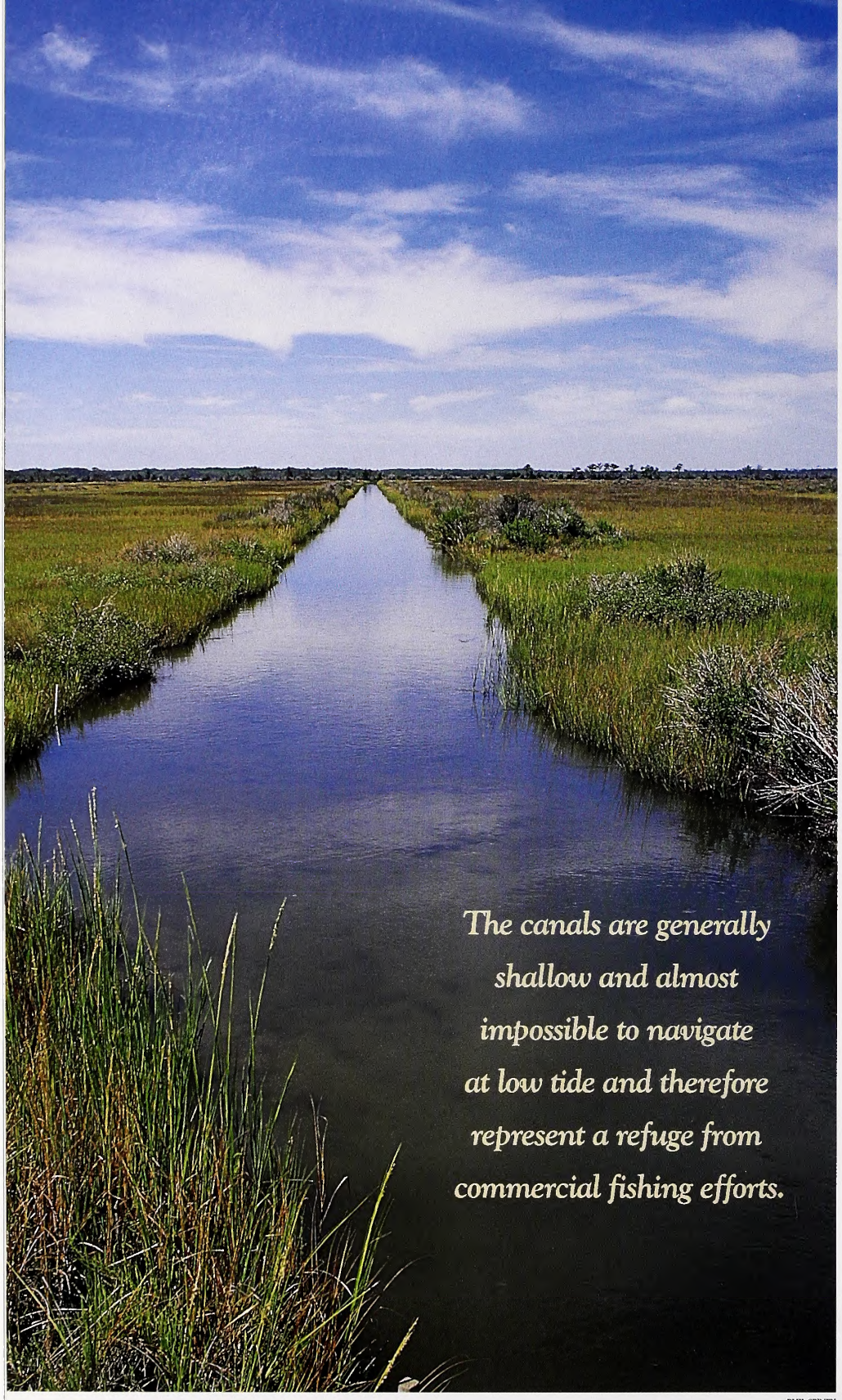
PHIL SPIVEY

Throughout their range, terrapins feed on almost any small crustaceans or mollusks, including snails, clams, mussels, scallops and a host of crab species. The heads of older females are proportionally much larger than those of males, a difference that enables the sexes to exploit quite different prey resources. Our Core Sound studies found that female terrapins concentrated on larger prey species than did males, a large percentage of their diet consisting of juvenile blue crabs more than 3 inches in width. One feeding technique that we observed in our study of female terrapins is their ability to "crop" limbs from large blue crabs. The much smaller males showed significant contrast by dining almost exclusively on tiny melampus snails, which live at the bases of marsh grasses within the intertidal zone. Melampus snails have thin, almost fragile shells compared to larger mollusks, and are easily crushed in the jaws of male terrapins. Oddly, studies in South Carolina have shown that terrapins of both sexes eat mainly periwinkle snails. While our study site had high densities of periwinkles, the terrapins rarely fed on them.

Diamondback terrapins feed primarily at high tide, when waters invade the expanses of salt marsh. This allows terrapins to feed while remaining in the water, giving them a fighting chance if pursued by predators, which include otters and even bald eagles. Otters are common in the canals of Core Sound.

PHIL SPIVEY

Though the scutes *of the diamondback terrapin shell all have a diamond shape, the shells come in a remarkable variety of colors (left). The diamondback terrapin is the only turtle species that can live in the brackish-water habitats of salt marshes (upper left).*



PHIL SPIVEY

In Core Sound, *old canals and ditches dug through the marshes to control mosquitos have created new habitat for diamondback terrapins. That's where researchers have found larger populations than normal. Terrapins spend most of the hot summer months buried under several inches of mud.*

In 1997, I tracked signals from one of our female terrapins and found her carapace and transmitter stashed on a high creek bank used by an otter as a feeding station.

Female terrapins reach sexual maturity at about 8 years, while males in their fourth year are able to breed successfully. The nesting season for diamondback terrapins extends from late May through early July, with most nests being deposited sometime in June. During this time, egg-laden females traipse onto sandy shores along creeks and bays, testing areas to build their nests. Almost any upland area adjacent to salt marsh is used for nesting. Terrapins don't always show good judgment in picking nest sites, sometimes using lawns, flower beds, roadsides and parking lots. Many terrapins meet their demise on roads while searching for a nest site. The sandy dredge islands created as a result of maintaining boating channels provide excellent nesting habitat and are typically free from mammalian predators.

The females emerge during high tides and dig nests 4- to 5-inches-deep with their hind feet. Not all female terrapins reproduce every year, and most probably produce eggs only every other year. After laying six to 12 eggs, they carefully pack sand over the nest. Though blowing sand quickly obscures any visual evidence of a nest, predators still destroy many of the nests. Raccoons locate nests with amazing proficiency, but opossums, foxes, mink, marsh-rice rats and crows are also significant predators.

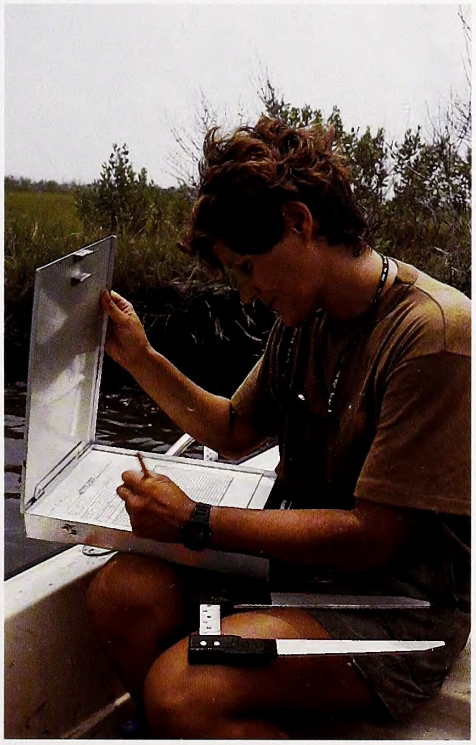
As with many other turtles, the sex of developing terrapins is determined by temperature. Cooler temperatures result in more males, while warmer temperatures produce more females. Incubation time is a function of temperature, but hatching generally occurs at around 55 days and may take as long as 104 days. The young terrapins don't always emerge immediately. In fact, many terrapin hatchlings do not venture from their sub-terranean home until the following spring, especially youngsters in nests laid late in the season.

Young terrapins have proven to be extremely cryptic in their selection of habitat. Within the Core Sound population, 4- to 5-year-old terrapins are common, yet younger ones were almost never observed. Extreme storm tides deposit large mats of "wrack," or dead marsh grass, far into the marsh which provide prime cover for young terrapins, making them difficult to find. Whit Gibbons, of the University of Georgia, has been studying the ecology of diamondback terrapins in estuarine areas around Kiawah Island, S.C., since 1980. Gibbons and his students have marked nearly 1,700 of the turtles. During all those years of

PHIL SPIVEY

***By attaching radio** transmitters to terrapin shells (above), researchers like Therese Conant (below), formerly with the Nongame and Endangered Wildlife Section, have discovered new information about diamondback movements and other aspects of their natural history.*

KEN TAYLOR



research, only five terrapins under 3 years old have been observed, yet undoubtedly young turtles exist.

Our radio telemetry research revealed much about the uses that diamondback terrapins make of their habitat. During the early, warm days of spring, large groups of terrapins gather on favorite basking sites to soak up warmth and make acquaintances. Terrapins spend much of their time during the hottest part of the summer buried in the marsh. Sometimes they are totally hidden under inches of mud, waiting for the higher spring tides to allow them to emerge and feed. Some individuals were found to have huge home ranges, roaming over areas as large as 1,000 acres, while others show strong fidelity to much smaller areas of tidal creeks or canals and have home ranges of around 200 acres.

Our research also helped to explain the high numbers of terrapins in our Core Sound study area. The numerous canals or ditches created there to control mosquitoes allowed an intertidal zone to form adjacent to the canals, which provided undisturbed new habitat for terrapins. The canals are generally shallow and almost impossible to navigate at low tide and therefore represent a refuge from commercial fishing efforts. Of the telemetry locations plotted in Core Sound, 86 percent were within these canals, indicating their importance to the diamondback terrapin.

Diamondback terrapin lore is abundant throughout the turtle's range. Native Americans held the diamondback terrapin in high esteem. Mounds along coastal areas lack remains of the terrapin, even though the species was abundant and could have represented a major food item. Terrapin parts have even been found in a Tuscarora burial site along the Roanoke River, possibly indicating a sacred role for the terrapin.

In his book *Time of the Turtle,* Jack Rudloe describes tales of the "hard-luck turtles" or "wind turtles," as locals of northwest Florida refer to diamondback terrapins. According to superstition, harassing a terrapin would bring on windy days, and taking one on board a vessel would cause trouble. You could put a hex on your enemy by etching his initials onto a terrapin's carapace.

These superstitions were not enough to prevent the truly phenomenal popularity of this species as a gourmet item, beginning in the late 1800s and early 1900s. The development of the "terrapin drag" in 1845 had made large-scale harvest possible. The terrapin drag was similar to an oyster drag, consisting of a metal frame with long teeth on the lower bar that dug into the mud. Behind the drag, a mesh tail-bag was attached to capture the sluggish terrapins as the contraption was towed behind a skiff. Modified oyster tongs, seine and dip nets, funnel traps and various other methods were also used to capture

KEN TAYLOR

Tom Henson of the *Nongame and Endangered Wildlife Section measures the carapace of a diamondback terrapin. Studying the life history of this species can give the Wildlife Resources Commission information that it will use to manage its populations in North Carolina.*

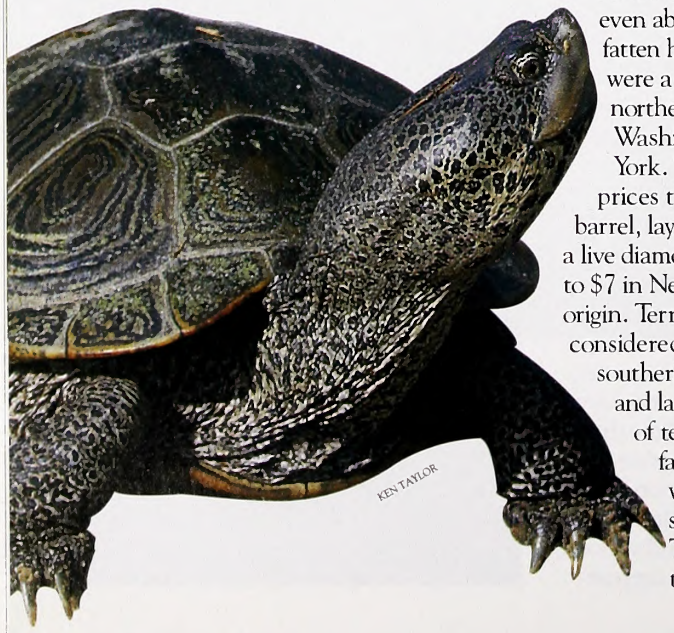
PHIL SPIVEY

terrapins during certain times of the year. Terrapins were caught as they hibernated in the bottoms of tidal creeks and canals. One fisherman on Roanoke Island harvested 4,050 terrapins in the winter of 1849, which sold for $750 in northern markets. Young people collected terrapins by hand and sometimes used sticks to probe shallow mud, hoping to strike the carapaces of hibernating terrapins. Children were paid 25 cents for adult females.

Terrapins served as the mainstay of the diet of slaves living in some coastal areas of South Carolina and Georgia and were even abundant enough to be used to fatten hogs. By the early 1900s, terrapins were a sought-after delicacy in many northern cities, including Baltimore, Washington, Philadelphia and New York. Terrapins fetched exorbitant prices there and were shipped by the barrel, layered in Spanish moss. In 1939, a live diamondback terrapin sold for $3.50 to $7 in New York, depending on its size and origin. Terrapins from Chesapeake Bay were considered superior to those from more southerly locations, being better flavored and lacking the overly gelatinous quality of terrapins from the Gulf Coast. The favorite way of preparing terrapin was in a thick cream sauce with sherry, served with champagne. The meat, properly prepared, was tender and full of flavor.

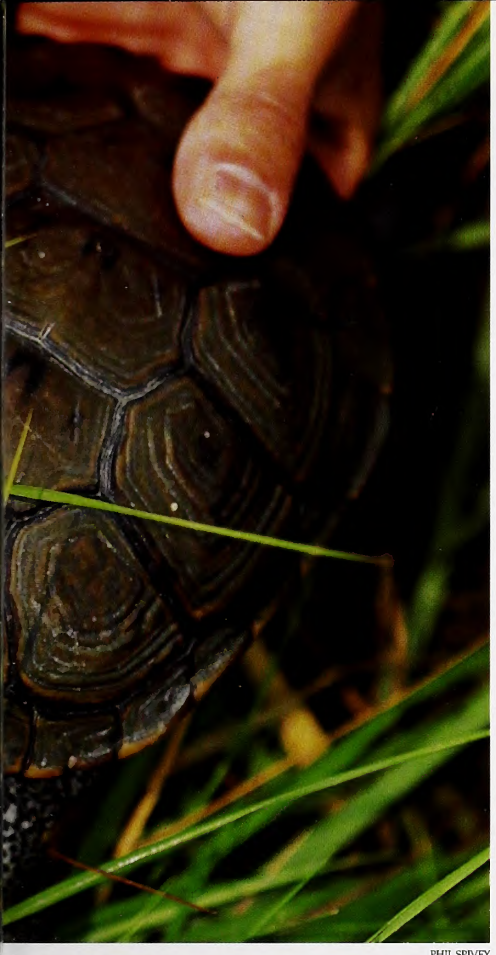
As the popularity of terrapin stew soared, most populations were considered "fished out" by 1900. Female terrapins were referred to as "cows" and males as "bulls," and considering it took two 9-year old "cows" to produce one pint of meat, local populations were quickly depleted. In coastal areas around Roanoke Island, local fishermen trained dogs to track the large female terrapins as they emerged onto sandy shorelines to lay their eggs.

By 1902, the excessive harvest of natural populations convinced the U.S. Bureau of Fisheries that captive propagation was necessary to sustain a supply of terrapins. In cooperation with the North Carolina Geologic and Economic Survey, the Beaufort Marine Laboratory was established with the purpose of exploring the techniques required to raise terrapins in captivity. The facility impounded small (20 feet by 30 feet) intertidal areas to house large numbers of terrapins. The original pens were built of wood, but later they were replaced with concrete walls, which are still present at the Beaufort laboratory today. The captive terrapins proved difficult to maintain without sufficient tidal flushing of the pens.



KEN TAYLOR

Crab pots can *ensnare diamondback terrapins, but more threatening still is human population growth along the coast. Highways are especially hazardous to the turtles as they search for nesting sites in late spring.*



PHIL SPIVEY

As a rule, female terrapins (right) are much larger than males (left). Because of the size difference, females tend to eat larger prey animals such as juvenile blue crabs, while the smaller males look for small melampus snails.

One of the most successful attempts to raise terrapins in captivity took place on Roanoke Island, where up to 6,000 terrapins were kept in large pens of 3 or 4 acres that were built to include upland sandy areas to allow females to lay eggs.

More recently, the terrapin has gained much popularity with Asian American markets in the Northeast. In Chinese lore, turtles represent age and wisdom, and eating turtle will increase one's life span. With many Asian species in severe decline, our native turtles are proving to be a convenient substitute. In a 1994 survey, an estimated 10,000 diamondback terrapins were sold in New York alone. Most of these reportedly originated from the Carolinas, Virginia and Maryland.

The diamondback terrapin has survived for thousands of years in the tidal marshes of our coast, even through years of major exploitation. But some ominous conservation questions are left unanswered. Will the terrapin survive the rapid changes our coastal landscape is experiencing? Despite the initial exploitation of the terrapin a century ago, the animal's habitat remained relatively intact. But today, the terrapin is being forced to share its domain with the most efficient competitor on the planet, and that bodes ill for its continued existence. ⊠

Phil Spivey is a wildlife biologist with the nongame section of the Georgia Department of Natural Resources.

PHIL SPIVEY

WHERE TO VIEW

PHIL SPIVEY

DIAMONDBACK TURTLES

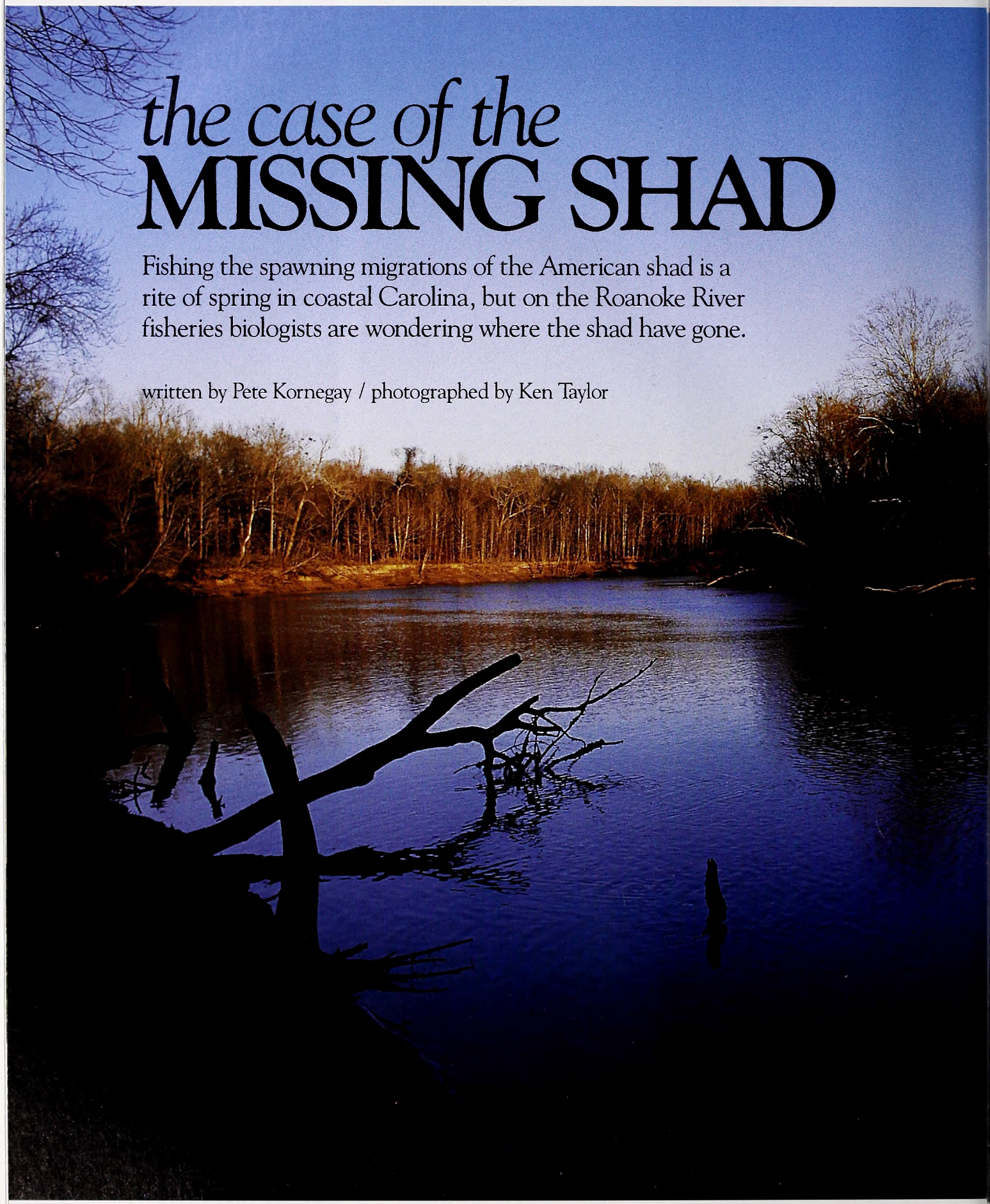
Diamondback terrapins are not easy to discover out of water. Your chances of seeing the turtles improve in brackish-water marshes, especially marshes with mosquito ditches. The marshes at Ocracoke, Davis Marsh in Carteret County and the marshes off Bald Head Island are among many places where terrapins are found. Look for them swimming just below the surface, with their dark snouts emerging periodically to breathe.

Also, state parks, aquariums and other coastal natural areas offer programs on terrapins, as well as viewing areas and exhibits. For information, call:

- N. C. Division of State Parks: (919) 733-4181
- N.C. Aquariums (Fort Fisher, Pine Knoll Shores, Roanoke Island): (919) 733-2290
- N.C. Maritime Museum (Beaufort): (252) 728-7317

RETURN THE GIFT

Wildlife is a gift often taken for granted. Please return it. The Nongame and Endangered Wildlife Program is dedicated to conserving native wildlife of North Carolina. Lend your support to this effort through a tax-deductible contribution on your North Carolina income tax form or send your contribution today to Nongame and Endangered Species, N.C. Wildlife Resources Commission, 1724 Mail Service Center, Raleigh, N.C. 27699-1724.



the case of the MISSING SHAD

Fishing the spawning migrations of the American shad is a rite of spring in coastal Carolina, but on the Roanoke River fisheries biologists are wondering where the shad have gone.

written by Pete Kornegay / photographed by Ken Taylor

Once extremely plentiful, *American shad (right) have all but disappeared on the Roanoke River in recent years. Fisheries biologists are at work trying to figure out what happened to the spring runs of shad in an effort to restore the fish to the Roanoke.*

LAWRENCE S. EARLEY

2000
YEAR OF THE RIVERS

Every spring, a miracle occurs

Every spring, a miracle occurs in eastern North Carolina as the shad begin their run. Imagine for a minute the senses that allow a 3-pound American shad to swim from Nova Scotia a couple of thousand miles through the ocean, locate an inlet, change its body chemistry to adapt to fresh water, then swim several hundred miles upstream fighting river currents, to reach the exact section in an eastern North Carolina stream where it was born four or five years earlier. It's quite a feat.

Native Americans and early colonists marveled at the annual arrival of these vast schools of fish, and though they didn't understand the processes behind the shad's appearance, they knew that another winter of near starvation was behind them and that food would be plentiful for the immediate future. In 1585, John White, governor of the Lost Colony, depicted how Native Americans cooked fish in a painting entitled "The broyling of their fish over the flame of fier." Scholars believe the fish in this illustration were American shad, and, in fact, archaeological digs along coastal rivers have turned up bones of American shad and other migratory fish. In the early 1700s, explorer John Lawson and his party were frequently offered shad by Native Americans. Lawson wrote, "Shads are a sweet Fish, but very bony; they are very plentiful at some Season."

Throughout the 1700s and 1800s, tons of American shad were commercially harvested from the sounds of North Carolina each spring, with haul seines and pound nets, then salted to preserve their oily flesh and exported to other countries. Even during tumultuous periods of North Carolina's history, the arrival of shad did not escape notice. In her extensive Civil War diary, Catherine Ann Devereux Edmondston, who lived near the banks of Roanoke River in Halifax County, noted on April 10, 1863: "On the 8th are beginning to have a few shad & Rock [striped bass] which is a relief to my housekeeping cares."

American shad begin life as tiny eggs spawned and fertilized in the rocky, flowing headwaters of coastal rivers. The timing of spawning varies depending on the river and water temperature, but generally it occurs from late April on the Cape Fear River to mid-June on the Roanoke River. Ripe females deposit thousands of eggs that are quickly fertilized by surrounding males. Female American shad are called "sequential" spawners because they don't spawn

2000
YEAR OF THE RIVERS

***Fisheries biologists** with the N.C. Wildlife Resources Commission use an electric current to stun American shad in the Meherrin River in Virginia (left). Biologists then transport the adult fish (above) to North Carolina where the shad can spawn in holding tanks. After a few weeks, the hatchery-raised shad fry are released into the Roanoke River. With luck, the young fish will return someday to the Roanoke as adults to spawn.*

all of their eggs at once but may participate in several different spawning events over the course of the season. The fertilized eggs tumble downstream, quickly swelling with water to a diameter of 1/8 inch. The quarter-inch fry hatch in five to nine days and live on their built-in yolk sac for another five to nine days, after which their mouthparts have developed.

At this point, the fry begin to feed on microscopic zooplankton, and as spring and early summer progress, shad fry continue to feed on zooplankton and grow. By summer's end, the 2-inch fingerling shad are concentrated in sounds and estuaries, and as is the case with most fish species that produce tremendous numbers of offspring, many die. We know very little about young shad after their first fall and winter. Their near absence in the sounds and estuaries indicates they are at sea, and it generally takes three to four years for males and four to five years for females before they return to spawn. Tagging studies show that American shad have a strong tendency to return to their natal streams to spawn.

The spawning behavior of American shad is indeed an amazing story, yet if given little interference, it happens like clockwork every spring. Unfortunately, we humans have interfered with every coastal river to the point that "natural" conditions, to which American shad are adapted, no longer exist. For example, on the Cape Fear River, locks and dams that blocked shad migration may have been responsible for significant declines in their numbers. In the past few years, however, the numbers of shad appear to be increasing as the U.S. Army Corps of Engineers has begun an innovative lock-opening schedule that allows shad to pass upstream. On the Neuse River, the upstream migration of American shad had been blocked for years by a low head dam near Goldsboro. In cooperation with state and federal agencies, Carolina Power & Light Co. voluntarily removed the dam, and American shad immediately ascended the Neuse to Raleigh. On the Tar River, a remnant American shad population still returns to Rocky Mount to spawn, but fluctuating springtime water levels from upstream dams may limit their spawning success. On the Chowan River and its tributaries, American shad still return each spring, but their abundance pales compared to that of the 1800s.

Currently, the biggest concern of fisheries biologists with the N.C. Wildlife Resources Commission is with the American shad on the Roanoke River. Except for a handful of fish, they are missing from the scene. Striped bass on the Roanoke River have made a tremendous comeback, and hickory shad are abundant as well, but American shad are nowhere to be found. We know from archaeological and historical records that American shad used to migrate far into Virginia, typically to Danville and sometimes as far as Salem, which is at the foot of the Blue Ridge Mountains! We also know that an active commercial fishery for American shad existed in Roanoke River during the 1800s and into the mid-1900s. So, where are these fish now? The short answer is that we do not know. But the Wildlife Commission, along with other state and federal agencies, has begun efforts to restore American shad to the Roanoke.

As you might expect, the answers to this mystery probably rest with what we've done to the Roanoke River over the last several decades. The Roanoke carries more water than any other river in the state, and beginning near its headwaters in Virginia, it is dammed and harnessed at numerous points for flood control and hydropower production. Could it be that the demise of American shad in Roanoke River was a result of dam construction, which cut spawners off from their traditional spawning grounds? North Carolina State University researchers fitted Roanoke River American shad with radio transmitter tags and followed them to the base of Roanoke Rapids dam, indicating that the fish would have continued upstream if given the chance.

Or perhaps water pollution is the culprit. After all, there are numerous industries and municipalities that discharge waste into the Roanoke River. And why are hickory shad doing so well in the Roanoke, but not American shad? Maybe hickory shad don't need all of that upstream mileage to spawn successfully.

Typically scientists have more questions than answers, and the case of American shad and Roanoke River is no exception. Over the next decade, all concerned resource agencies, along with utility companies and other water users, will embark on a concerted effort to bring back American shad to the Roanoke. American shad have been successfully restored in other places such as the Susquehanna River in Maryland and Pennsylvania, and our program will likely follow the lead and advice of scientists and water managers in those states. What did it take in other places to bring back the shad? Well, it took stocking millions of hatchery-raised shad fry, moving adult shad around dams with transport tanks, and in some instances building expensive fish elevators to move shad past dams. Above all, it took cooperation among the water users and an acknowledgement that bringing back the shad was the right thing to do.

Stay tuned to these pages. Over the coming years, we hope to bring you progress reports on our efforts to restore American shad to Roanoke River. Hopefully, we'll solve the case of the missing shad. ⊠

Pete Kornegay is the Wildlife Commission's fisheries research coordinator for the coastal region.

Catching SHAD

If you've never caught an American shad on hook and line, you're missing one of life's great pleasures. Just like its first cousin, the hickory shad, it'll take the typical shad dart and spoon combination. Unlike with hickory shad, you'd better be holding onto the rod when it hits—a 3- or 4-pound American shad (the state record is 7 pounds, 15 ounces) can smoke line off a reel like a tuna. Landing nets are highly recommended when fishing for American shad. The combination of a heavy fish, river currents and thin mouth membranes doesn't lend itself to horsing a shad into the boat without a net.

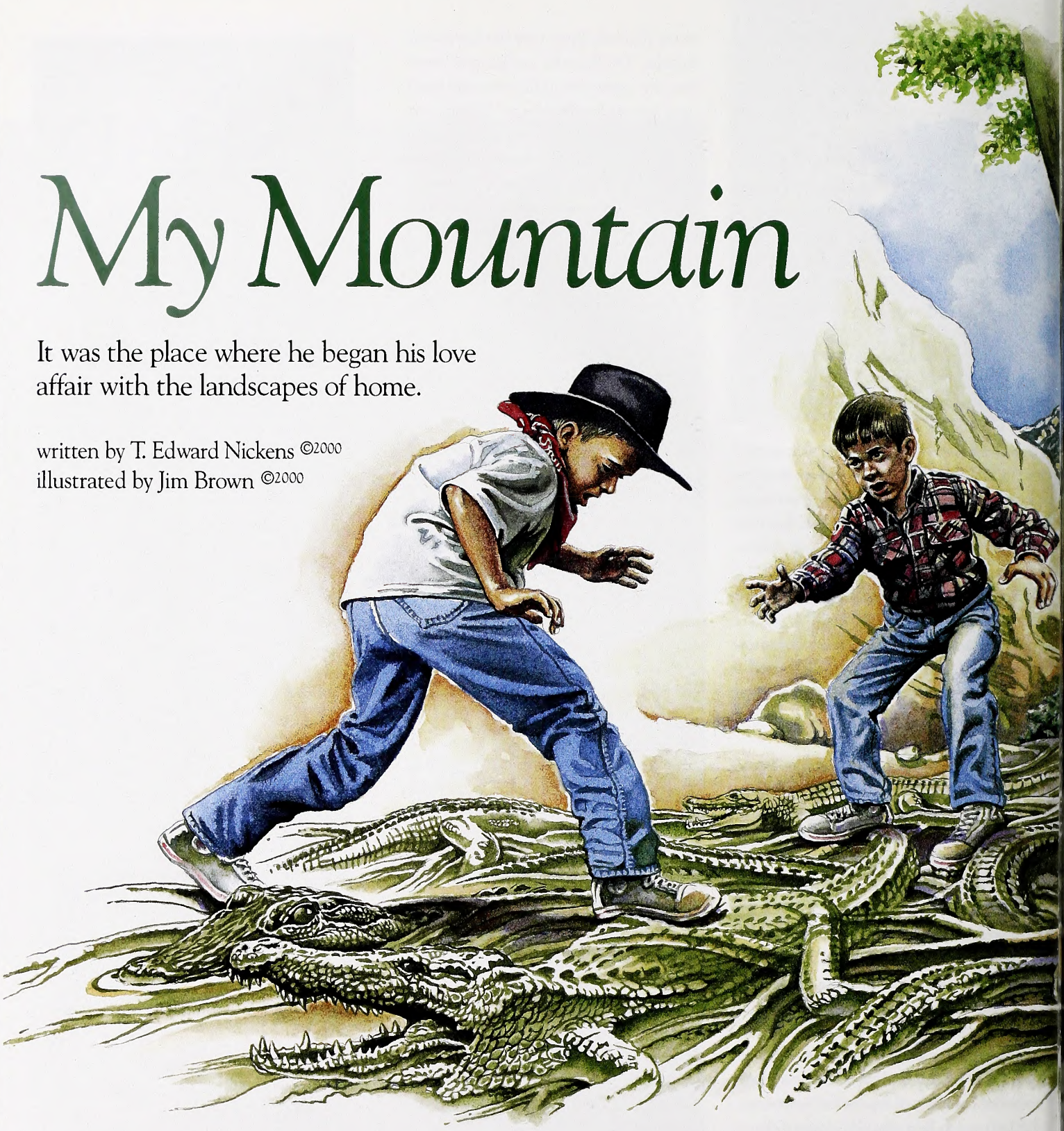
Nearly everyone who fishes for shad has heard the story of how to cook one: "Bake the shad on an oak plank, throw away the shad and eat the plank." Not true. As John Lawson attested nearly 300 years ago, they are quite tasty but bony. Most folks bake shad in the oven for a several hours over low heat, then patiently pull the meat away from the bones. The roe (which is actually the ovaries containing thousands of eggs) of American shad is highly prized by some. Whether fried whole or mixed with scrambled eggs, shad roe has, let's say, a "unique" flavor.

shad dart

My Mountain

It was the place where he began his love affair with the landscapes of home.

written by T. Edward Nickens ©2000
illustrated by Jim Brown ©2000



Even as a kid, racing my brother up the trail and out of earshot of our mother, I knew that Hanging Rock was just barely a mountain. For one thing, it wasn't far enough west to be a REAL mountain. At least not like the Smokies, where I awoke one morning to find fresh bear tracks by our family tent, or the undulating Blue Ridge, where we camped a half-dozen times each year. Nor did Hanging Rock soar high enough for true mountain status. Out there in the far western corner of the Piedmont, Hanging Rock does break the 2,000-foot mark, and the summit trail tunnels through mountain laurel and umbrella magnolia. But the mountain's quartzite cap rises just a few hundred feet above the surrounding hills, a conspicuous bump on a corrugated landscape, yes, but no Everest. Yet in my childhood days, when I consumed biographies of Kit Carson and Davy Crockett and the Green

Mountain Boys like penny candy, Hanging Rock was MY mountain, held close with a proprietary ardor born of familiarity.

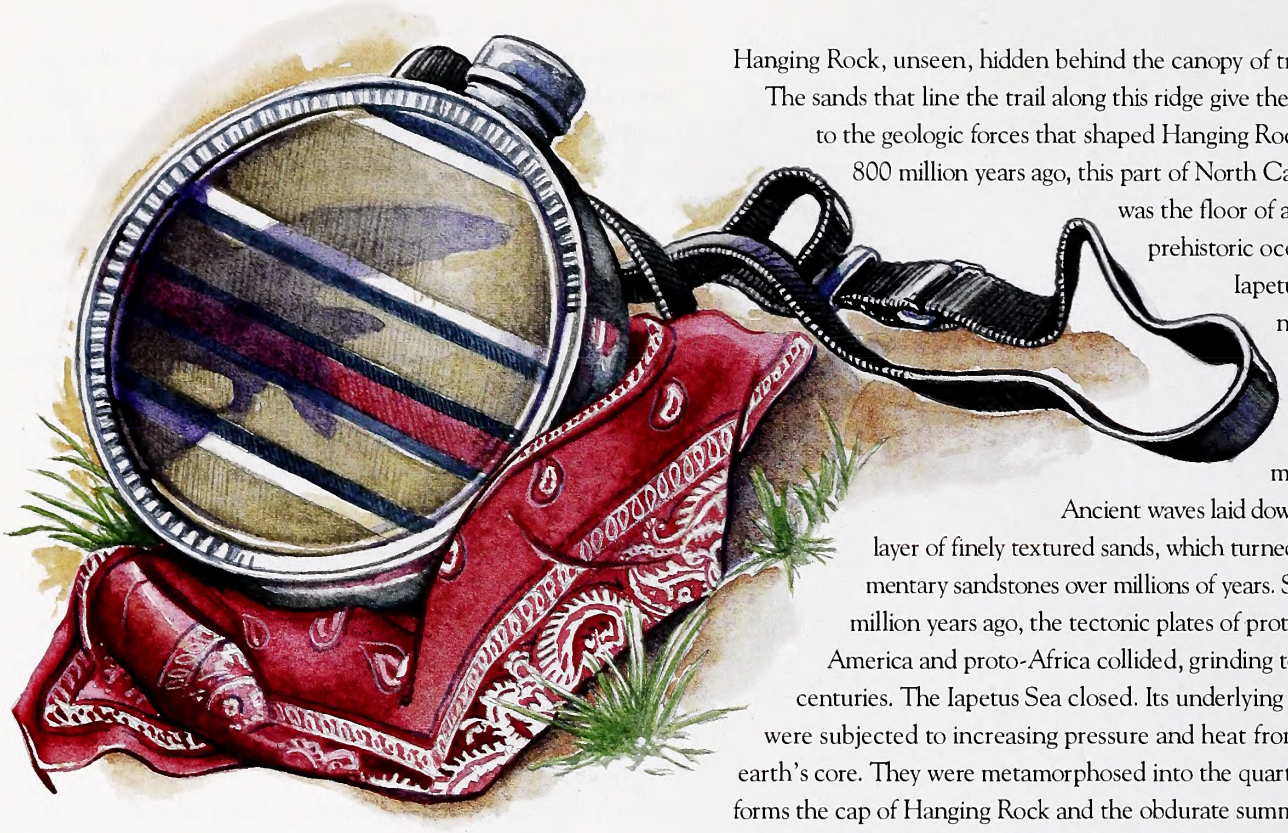
Hanging Rock State Park was just a two-hour drive from where I grew up in High Point, and I could not count the number of times I have been there. But when I returned on a blistering hot August day last summer, 20 years had passed since my last visit. The serpentine roads leading into the park were still comfortingly familiar, edged with the same old low stone walls and wooden barriers that greeted me in my youth. But the parking lot to the Hanging Rock trailhead had doubled in size, to Wal-Mart proportions, and a large visitors center had been built nearby. I parked the truck and strapped on a fanny pack filled with binoculars and a half-gallon of water. Two decades can bring great change, to a place and to a person. I reminded myself of this as I stretched my hamstrings at the trailhead and then stepped onto my boyhood trail, with creaky knees a-popping.

Hanging Rock's proximity to the metropolitan centers of the Piedmont makes it a popular destination. Some 400,000 visitors trek to the park each year, a fraction of the number of visitors to the Great Smoky Mountains National Park, although Hanging Rock offers but .012 percent of the acreage. Thirty years ago, even, the heavy foot traffic beating up to the rock dome took its toll on the trail. From the parking lot, I recall, an enormous latticework of exposed tree roots snaked along and across the trail for a half-mile or so. Hopping from tree root to tree root gave rise to incredible fancy; the environmental sensibilities of a kid in Keds and Husky jeans could hardly recognize trail washout and erosion. Instead, the tree roots were the backs of crocodiles slithering into the Nile, or narrow ledges that afforded escape from pursuing Indians. For hundreds of yards through the woods, my brother, Mark, and I teetered and tottered on tree roots, in a contest to see who could go the farthest without touching ground.

On my last trip, however, I found the trail a sidewalk—and a wide one—all the way down to Indian Creek and on up the far slope. In fact, it's not even the same route I took in my youth. So much foot traffic pounds toward Hanging Rock that park managers long ago relocated the trail and sheathed the new one in cement, to let the old scar heal, hidden just over a ridge. It's a bit of a disappointment, even if the underlying policy is altogether sound. The trail seems tamed—it is tamed—and the route is lacking something, if nothing more than the chance to twist an ankle and let the imagination soar.

Happily, the trail gradually shed its civility as I pushed up the slope beyond Indian Creek, turning from cement to gravel as I climbed, past a massive fallen basket oak with a hollow trunk. I kicked at the dark, rotten heartwood and sent a five-lined skink skittering away, its electric-blue tail slipping into a narrow crack. The sight reminded me of a long strand of spaghetti, disappearing into the puckered, grinning mouth of my 3-year-old daughter.

The gravel gave out at the top of the steep pitch, and the trail took a hard right-hand turn along a knife-edged ridge that runs like the back of an angry dog toward the Hanging Rock massif. The ridge was cloaked in glorious hardwoods—red oaks 3 feet thick, basket oaks, hickories, tulip trees, rising from an understory of red maple and pungent sassafras. A tiny green inchworm hung from an invisible thread of silk in the airspace above the trail, and I gently brushed it out of the way. I turned toward



Hanging Rock, unseen, hidden behind the canopy of trees.

The sands that line the trail along this ridge give the first clues to the geologic forces that shaped Hanging Rock. Some 800 million years ago, this part of North Carolina was the floor of a vast prehistoric ocean, the Iapetus Sea, named for the father of Atlantis in Greek mythology. Ancient waves laid down layer upon layer of finely textured sands, which turned into sedimentary sandstones over millions of years. Some 500 million years ago, the tectonic plates of proto-North America and proto-Africa collided, grinding together for centuries. The Iapetus Sea closed. Its underlying sandstones were subjected to increasing pressure and heat from the earth's core. They were metamorphosed into the quartzite that forms the cap of Hanging Rock and the obdurate summits of the surrounding Sauratown Mountains. In the ages that have passed since, all the surrounding softer sandstone has eroded away, leaving behind the monadnocks of quartzite rising high above the surrounding plain. The clean white sands of those ancient beaches now form the rugged cliffs of Hanging Rock.

No such rocky crags are found on the knife-edged ridge, however. Its old rooftop of hard quartzite has crashed into the valleys below, undercut by eons of erosion. At some time in the distant future, Hanging Rock itself will look like this: A sandy knob lording over a valley littered with house-sized boulders. But not today. From the ridge I got my first view of Hanging Rock itself, a gray fortress of stone with a deep fissure on the right-hand side that allowed kids in Keds and even mothers a way of scrambling to the top. With that first glimpse of cliffs ahead, rising above the ridge and the trees against a gauzy blue sky, a welter of memory rushed in. The oversized backpack that bumped the backs of my thighs. My mother's suede hiking boots with crepe rubber soles. A blue bandanna tied around my father's neck. The metallic taste of water from a hot aluminum canteen.

The rock loomed through the trees, and I swear I could hear my mother's call for Mark and me to stay in sight and off the rock. Thirty years have passed since those days, years filled with trips to wildernesses from Alaska to the Caribbean rain forests. Alongside the glacier-capped Mount Rainier, Hanging Rock is a humble hillock.

"*...a welter of memory rushed in.*

The oversized backpack that bumped the backs of my thighs.

My mother's suede hiking boots with crepe rubber soles.

A blue bandanna tied around my father's neck.

The metallic taste of water from a hot aluminum canteen."

Compared to the soaring pinnacles of the Canadian Rockies, this lump of quartzite nodding over the North Carolina Piedmont seems an afterthought of topography. Still, I recognized that humble knob for what it has been in my life: A totem of a lifelong love of the wild. The first of many mountains.

A fence lizard skittered through dry leaves, jarring me back into the present. At the base of the cliff walls, I realized that the trail today sneaks around the right-hand side of the bluff, bypassing the old knee-elbow-and-butt scramble straight up a rocky chute to the top. Bummer. That used to be a highlight of the whole trip; for a kid who could conjure South American reptiles from tree roots, that nearly technical climb launched a thousand imaginary assaults on the Eiger. No way such an adventure would wash in today's litigious world. The loss is as understandable as the widened trail to Hanging Rock—a route designed, in part, to accommodate rescue vehicles —and just as lamentable. I leaned into the cool shade cast by the cliff, and drained a half-quart of water. Then I hiked to the top.

I'm not sure what I expected atop Hanging Rock's noggin—a panorama less expansive than the one that greeted me as a young boy, perhaps, like revisiting your elementary school only to find that the hallways seem tiny compared to the ones you remember. But as I inched out to the edge of the rock, I couldn't help but smile. Yes, there are more clearings today, especially toward the east, where the sprawling Triad gnaws at the vernal coverlet of the Piedmont. Beyond the mesalike profile of Flat Shoal Mountain, there seemed to be as many tract houses as tobacco fields, and at least one cellphone tower is a new and unwelcome addition to the horizon. The view has changed in subtle, telling ways, but it is still the view that molded a child's perception of place.

For it was never the panorama's finer details that struck me as a kid. Instead, it was the awesome, instant expansion of perspective found atop Hanging Rock. Nothing along the trail ever hints at the magnificent view, and on each visit I was awed by the possibilities made manifest by the view from my mountain. I remember tucking myself into a fissure of rock with the 7X binoculars that were my best-ever Christmas gift, and glassing each ridge and fold in the land.

To the east, the rolling Piedmont stretched all the way to the edge of the distant green horizon. It was almost as if I could see the curve of the earth, and I knew that out there somewhere was the Coastal Plain, whose swamps and blackwater rivers I had read about and wanted to explore, and beyond them the barrier islands and the wide sounds. And to the west—I looked especially to the west—there were the first pregnant swells that denoted the subtle Blue Ridge, and I knew that not far behind lay the great Appalachian chain, home of the Blacks, the Unakas, the Nantahalas. I knew little of plate tectonics and erosional weathering, and I couldn't have put it into words, but I believe that when I climbed Hanging Rock and swept my eyes from east to west, I first began to understand the possibilities of home. The Eigers and Everests never lost their allure. But the view from Hanging Rock revealed a land as unexplored to a 12-year-old as Nepal. From it sounded a different siren, sung in my native tongue.

On my trip last summer I shared Hanging Rock with a family agog at the half-dozen soaring "eagles"—turkey buzzards, actually —that ride the valley updrafts. Time and time again the black birds welled up and over the rock, like ash swirling from a ground fire, joined by a quartet of ravens. Nearby, two little towheaded boys played cowboys and Indians, emerging from a deep fissure to report that someone had painted their names and the date on the dark rock back in the dim recesses of 1976. I lay down on the lip of Hanging Rock, a knuckle of stone under the small of my back, and swept binoculars across distant valleys, the forests in the foreground, the crenellated horizon to the west.

If you know what you are looking for, you can look out from Hanging Rock and read the palm of deep time. The mountains to the west are the rocky roots of high alpine ranges thrust up from the earth's surface over a quarter-billion-year span of time. The highest mountains once were located on the suture between the two ancient continents and soared as much as 30,000 feet above sea level. As the old continents of Africa and North America reversed direction and began to pull apart, some 200 million years ago, the Atlantic Ocean poured into the rift. Huge chunks of the earth's crust dropped into other fractures, forming other land features. The western border of the low-lying Triassic basins is just visible from Hanging Rock, and look carefully and you can pick out the Dan River basin, whose eponymous stream carries the sands of the Sauratown Mountains to the distant, present-day ocean.

Rising above it all is the place where I began my love affair with the landscapes of home: Hanging Rock, my home mountain, where I first scrambled through rhododendron thickets and climbed high enough to taste fear. Up there I could see a land where surf crashed just beyond the eastern horizon, and unclimbed mountains swelled just out of sight to the west, and where a little boy could walk on the beaches of an ancient sea. ⊠

Keen on catching striped bass on winter reservoirs? Try these tactics to take the mystery out of cold-water striper fishing.

Written and photographed by David Hart ©2000

No-Hassle stripers

Fishermen pride themselves on their ability to tough out foul weather and other adverse conditions. We like to laugh at city folks who cower in front of the boob tube on a cold, rainy winter afternoon. I guess that's why my friend and Kerr Reservoir guide Shorty Osborn and I had this 50,000-acre reservoir practically to ourselves. Yes, it was February. Yes, it was cold. Yes, a steady, bone-chilling rain fell throughout the day. But, yes, we were catching fish. Lots of them.

To put it mildly, Osborn is nuts about fishing, particularly striper fishing. The Farmville, Va., resident figures he spends about 200 days a year on the water. Half of them are during the dead of winter in pursuit of striped bass. Unlike most other striped bass fanatics, he doesn't mess with live bait, and he can't stand trolling.

"Why should I?" he says, if you ask why he shuns such productive methods.

He's got a point. Osborn scores regularly with one bait—a 3/8-ounce white bucktail jig tipped with a white, 6-inch plastic worm. That's all he uses, all the time. To you and me, it doesn't look very much like a shad, but in the hands of a skilled angler like Osborn, or even a bonehead like me, it'll fool stripers all day long.

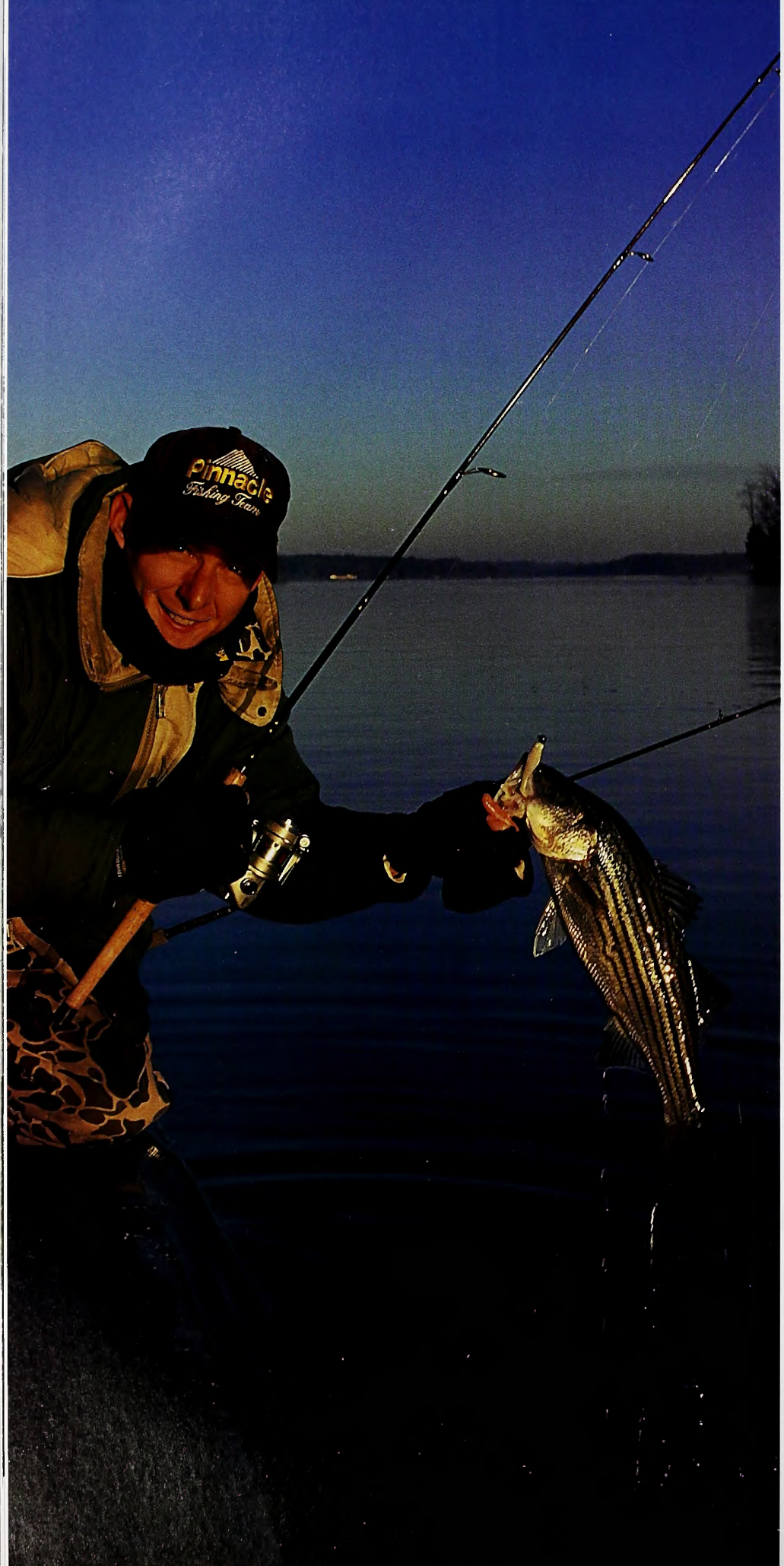
Sure, it's no secret that gamefish are easy to sucker with the real thing. Live bait, particularly herring and shad, are tops for catching stripers and largemouth. But who has the time to catch the darn things? Wouldn't you like to be spending that time casting a lure to fishy-looking areas instead of hunting for a school of shad?

Remember that guy heaving that cast net last fall? He made a perfect circle every time he threw it, but it took him an hour to catch two dozen shad. By the time he called it quits, he was soaking wet, his shoulders ached and he was ornery because he lost an hour of valuable fishing time.

Of course, it's not just the hassles of catching live bait that take the fun out of fishing with it; it's the expense of keeping baitfish alive, too. You've got to plunk down two hundred bucks on a 20-gallon bait tank, aerator and assorted chemicals. That's before you can even go out and catch any bait.

What about those two anglers trolling back and forth across your favorite spot, for hours on end? It's a safe bet a steady tailwind blew those foul-smelling exhaust fumes up

Tired of burning daylight, *not to mention your muscles, casting a net for live bait? Consider using a white bucktail or sassy shad (above) to imitate baitfish and take the hassle out of winter striper fishing in the process.*



***Shad-imitating lures** are your best bet for duping striped bass in the winter. Bucktails, lead-head jigs and crankbaits will all do the trick if fished properly. The key, especially in winter, is to work your lure slowly over points near deep water. And always keep your line tight.*

their noses all day and the constant chugging of their outboard numbed their hearing a notch or two.

Maybe my friend is onto something. Judging by his success, it sure looks that way.

The Mystery of Finding Fish

Mystery? Maybe that's an overstatement. Hey, they're just fish. They're cold, slimy and pea-brained. What could be so difficult about tracking down a striped bass in a sprawling reservoir like Kerr Lake or Gaston? Plenty, if you've never tried.

The truth is, stripers aren't randomly scattered all over a sprawling reservoir the way largemouth bass are. They move from one end of the lake to the other with the changing seasons.

But striped bass are, like most other fish, creatures of habit and will stage in certain places at certain times of the year. And though they may move from one area to the next like nomads, they usually inhabit the same type of terrain throughout a particular season. In other words, the fish may hug midlake humps in the summertime, but they won't always stay on the same humps every day. They move.

But when the leaves start to lose their summer colors and reds, yellows and oranges light up the lake banks, it's time to move closer to the shore and search for feeding stripers in shallower water. These are cold-weather fish. In fact, they despise hot weather. That's why they seek refuge from the summer heat in deep water near main lake channels. Sure, you can catch them in the dog days of July and August, but they just don't feed much, they're skinny as rails and they don't have much fight in them.

Come autumn, however, and linesiders come alive. Shad start to ball up in tight schools and striped bass harass them throughout the day. They eat like pigs and gain weight and strength as the days grow shorter and the water temperature falls.

So how do you find a fish that migrates from one end of a lake to the other with the change of seasons?

If you are unfamiliar with a lake, or are new to striped bass fishing, don't be afraid to pay a visit to a lakeside tackle shop and ask lots of questions. Locals keep tabs on where fish hang out at certain times of the year and are often loose-lipped when it comes to giving away their knowledge. Of course, advice

usually flows a little more freely if you plunk down a few bucks on some lures. Hitting up locals is no secret, but far too few anglers bother to get a head start by doing so.

Generally, cold-weather stripers frequent points near middle or lower sections of lakes. Those are great places to start looking. Not just any points, though. They like points with access to deep water in case they need to escape whatever danger comes their way. (I have no idea what could frighten a 20-pound striper, except perhaps one of those legendary 150-pound catfish that scared the dickens out of your friend Charlie's uncle's brother, who happened to see one while SCUBA diving a couple of years ago!) That means both primary and secondary points near creek channels, ledges and main river channels.

To find that type of habitat, it's important to have a good map. In fact, to venture out onto a lake in pursuit of striped bass without one would be a crapshoot. You could spend an entire day fishing good-looking shoreline only to find yourself on the wrong side of the cove. The creek channel you're looking for may be behind you.

Not all stripers will be holding on points near deep water, however. Plenty of fish will suspend under schools of bait in open water, hug humps out in the middle of no-man's-land, or roam up and down channels in search of an easy meal. You can certainly catch those fish, but to find striped bass without cruising for two hours with one eye on your depth finder, narrow your search to points. They are easy to find, easy to fish and plentiful in any large reservoir.

The Perfect Lure?

Without question, striped bass favor schooling baitfish such as shad and herring for breakfast, lunch and dinner. Bluegills, small bass and even young stripers are gobbled up on occasion, but for the most part, soft-finned baitfish are easier to swallow and more likely to present themselves on a dinner platter to a waiting striper.

For that reason, shad-imitating lures are your best bet for duping North Carolina's (or any state's) striped bass, particularly ones that hang around points. Rubber shad bodies impaled on lead-head jigs (often called sassy shads) work great; so do bucktails, crankbaits, and, under the right conditions, topwater lures.

But generally, the colder the water, the slower you should fish your lure. Remember that fish are cold-blooded and can't move too quickly in chilly water. Take several different-sized jig heads or bucktails and try a variety of combinations until you find the one the fish want. That may not sound too specific, but with any type of fishing, changing weather and seasonal patterns call for different tactics.

Remember my friend Shorty? He swears by his hand-tied bucktails. Why shouldn't he? Shorty catches fish just about every time he tries. That's a good reason to stick with his favorite lure. It may seem odd to some anglers, but he never throws a heavier lure, or a lighter one. Three-eighths of an ounce of lead, some deer hair and a white plastic worm—that's what he sticks to.

Still confused? Just do what Shorty does. If it works for him....

It's All in the Technique

Most striper experts agree that the ideal water temperature for finding actively feeding fish is right around 50 degrees, but they say that fish will bite well if the water cools another 5 degrees. If it drops below 45, you're in for a tough day of fishing, so seek out warmer water, slow your bait wa-a-ay down or go home and cower in front of the television.

Finding the fish is often the hard part for novice striper anglers. Getting them to bite is usually a piece of cake. If an easy meal swims past a striped bass, it's a safe bet the striper will eat it, whether it's the real thing or a mediocre imitation.

Simply position your boat in water 12 to 20 feet deep and work a point thoroughly. Start on one side and fish your way around to the other, casting your lure right to the bank and swimming it back to the boat through deeper water.

Sometimes the fish will be close to shore, other times they'll be in 14 feet of water. I've hooked midwinter stripers in as little as 2 feet of water on both cloudy and bright, sunny days.

Sassy shads and bucktails both have little action to entice fish. That's why it's up to you to make them come alive. Lift your rod tip and let the lure fall as you bring it back to the boat, but make sure the lure follows the contour of the bottom. It's okay if you get hung on rocks, stumps and other underwater debris; that's where these fish will be. In fact, if you're not losing some lures, you're not fishing the right depth.

Remember to keep the lure moving and always try to stay in contact with it. Slack line is a striper angler's enemy. Lift your rod tip and lower it, reeling in the slack line as the lure falls. That up-and-down motion seems to draw strikes, but sometimes those strikes will be mere taps. If you feel a slight bump, set the hook. It's probably a fish.

Cold-weather striped bass fishing doesn't have to be a mystery. You don't need any fancy tackle—regular bass rods and reels will do—and you don't have to buy a downrigger or bait tank. Just get out on your favorite reservoir, armed with a good map and some information from a local tackle shop, and start working those points. ⊠

Where to Start

Straddling the North Carolina-Virginia line, Kerr Reservoir is the premier lake for catching large striped bass. Nearby Lake Gaston also has a decent striper population, but it has been struggling in recent years. Badin Lake, near Albemarle in the central Piedmont, is a very good striper lake on the Yadkin chain. Most of the other Catawba and Yadkin lakes can also be good for stripers at times.

Catch rates for stripers are high at Lake Norman, north of Charlotte, but the fish are typically small. Jordan Lake, near Pittsboro, has some hybrids (Bodie bass) and a few striped bass. Falls Lake, north of Raleigh, also holds some striped bass.

Stripers aren't the only fish that will nail a slow-moving bucktail in the dead of winter. Largemouth bass will pounce on one of these shad imitators, as well. In fact, the colder months can be the best time to cross paths with an oversized bucketmouth.

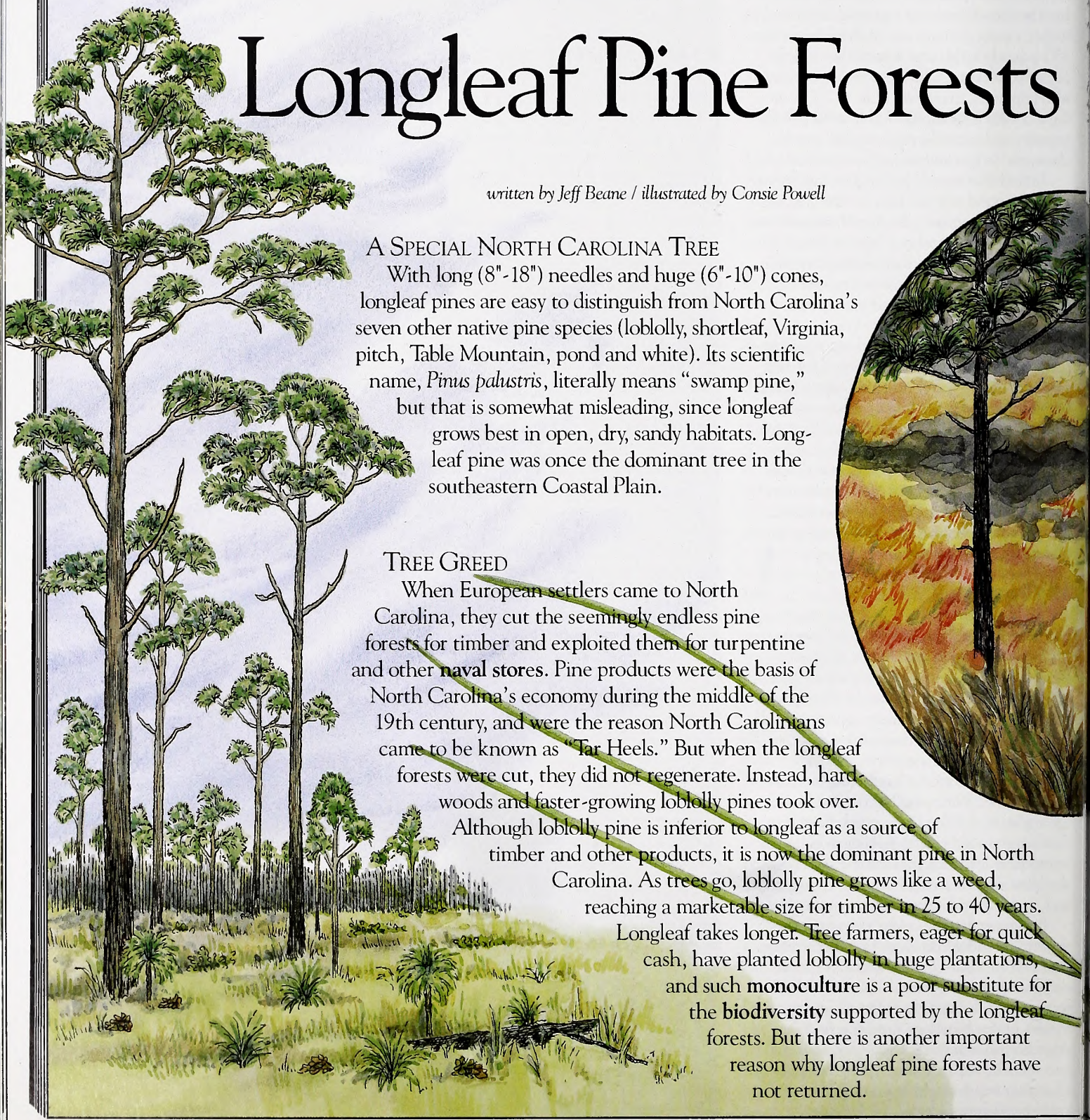
Like striped bass, largemouth will move up and down with changing weather patterns. One day, they might be tight to shoreline cover in 3 feet of water; a fast-moving cold front might push them into 16 feet of water the next day.

To find quality largemouths, just look for stripers. Both fish rely on bite-sized shad to keep them fat and happy throughout the year. Winter is no different. Find the bait and you'll find the predators.

Huge forests of longleaf pine once stretched from Virginia to Texas and covered much of the eastern half of North Carolina. More than 90 percent of that forest is gone now. What happened to it?

Longleaf Pine Forests

written by Jeff Beane / illustrated by Consie Powell



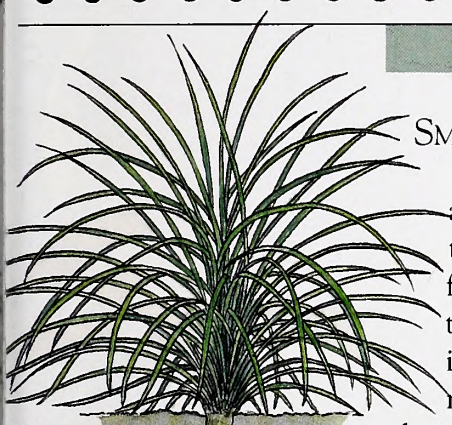
A Special North Carolina Tree

With long (8"-18") needles and huge (6"-10") cones, longleaf pines are easy to distinguish from North Carolina's seven other native pine species (loblolly, shortleaf, Virginia, pitch, Table Mountain, pond and white). Its scientific name, *Pinus palustris*, literally means "swamp pine," but that is somewhat misleading, since longleaf grows best in open, dry, sandy habitats. Longleaf pine was once the dominant tree in the southeastern Coastal Plain.

Tree Greed

When European settlers came to North Carolina, they cut the seemingly endless pine forests for timber and exploited them for turpentine and other **naval stores**. Pine products were the basis of North Carolina's economy during the middle of the 19th century, and were the reason North Carolinians came to be known as "Tar Heels." But when the longleaf forests were cut, they did not regenerate. Instead, hardwoods and faster-growing loblolly pines took over.

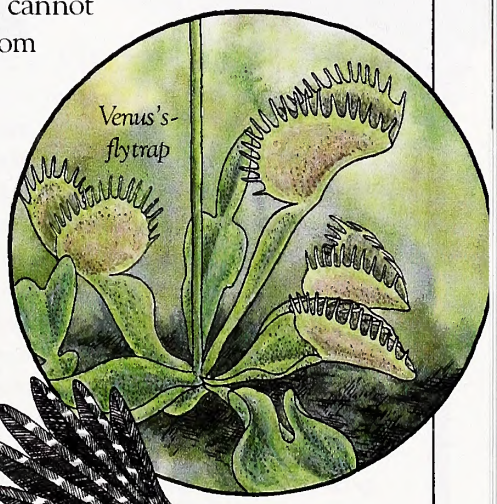
Although loblolly pine is inferior to longleaf as a source of timber and other products, it is now the dominant pine in North Carolina. As trees go, loblolly pine grows like a weed, reaching a marketable size for timber in 25 to 40 years. Longleaf takes longer. Tree farmers, eager for quick cash, have planted loblolly in huge plantations, and such **monoculture** is a poor substitute for the **biodiversity** supported by the longleaf forests. But there is another important reason why longleaf pine forests have not returned.



longleaf pine grass stage

SMOKEY WAS WRONG

For many years, Smokey the Bear begged us to prevent forest fires, but he had a lot to learn about longleaf pine forests! Longleaf forests are not only resistant to fires—they need them. Originally, vast areas of the Coastal Plain burned frequently due to fires ignited naturally by lightning. These fires killed most trees, but not longleaf pine. A young longleaf spends the first several years of its life in a low, brushy "grass stage" with its **terminal bud** protected by thick needles. During this time, it puts down a deep **taproot** to help anchor it and to draw water and nutrients from the often poor, sandy soil. For the next few years it shoots up quickly, lifting the bud above the range of most surface fires, and develops a thick, fire-resistant bark. Most other trees have no such adaptations. Even turkey oak, the tree that grows most often in association with longleaf pine, cannot survive very hot or repeated burns. When fire was removed from the system, loblolly pines and **scrub oaks** flourished, and longleaf pines could not compete.



Venus's-flytrap

ADAPTED TO FIRE

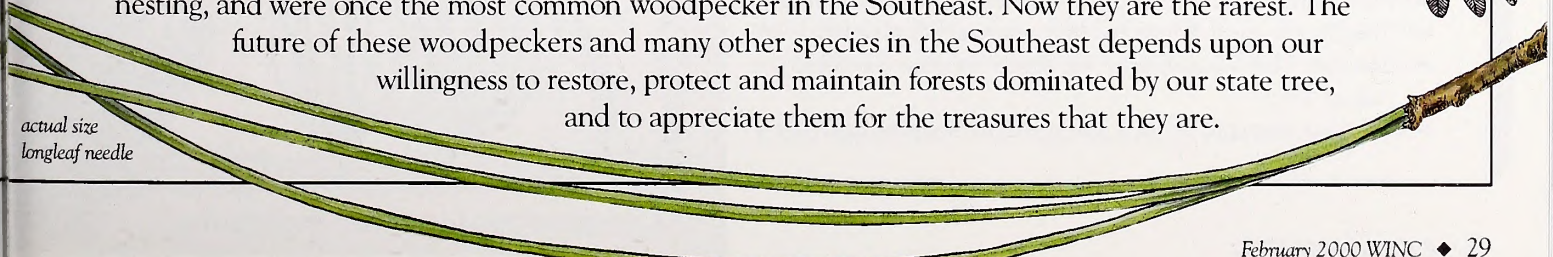
Many creatures and plants that live in the longleaf forest are also adapted to fire. Some plants cannot **germinate** without it. Wiregrass, which grows in thick clumps beneath most longleaf pine stands, acts as fuel for fires and thus ensures its own survival. The Venus's flytrap, found only in longleaf pine **savannas** in North and South Carolina, is one of the most fire-dependent plants known. Fox squirrels in the Southeast may have developed their black and gray color phases as camouflage against fire-blackened tree trunks.

Today, agencies such as the N.C. Wildlife Resources Commission and The Nature Conservancy, as well as private individuals who manage tracts of longleaf pine forest, must periodically set fires to maintain the longleaf community. Often **firebreaks** must be dug to protect adjacent tracts of private land during such **prescribed burns**.

red-cockaded woodpecker

AN ECOSYSTEM IN TROUBLE

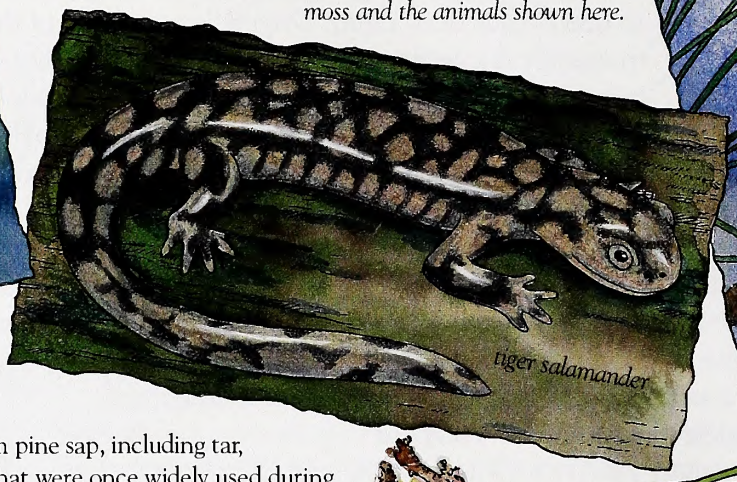
When the longleaf pine forests began to disappear, so did all the creatures that lived in them. A large percentage of the plants and animals in the Southeast that are endangered, threatened, or rare are associated with the longleaf pine ecosystem. The red-cockaded woodpecker—one of our most studied endangered species—is a good example. Red-cockaded woodpeckers depend on mature stands of longleaf pine for nesting, and were once the most common woodpecker in the Southeast. Now they are the rarest. The future of these woodpeckers and many other species in the Southeast depends upon our willingness to restore, protect and maintain forests dominated by our state tree, and to appreciate them for the treasures that they are.



actual size longleaf needle

North Carolina WILD Notebook

Many species have become uncommon in North Carolina because of the loss of longleaf forests. They include the pine snake, southern hognose snake, mimic glass lizard, gopher frog, rough-leafed loosestrife, Michaux's sumac, chaffseed, Sandhills pyxie-moss and the animals shown here.



What Does It Mean?

naval stores: products made from pine sap, including tar, pitch, rosin and turpentine, that were once widely used during the era of wooden ships

monoculture: planting of a single crop over a large area

biodiversity: rich variety of different life forms, usually indicating a healthy ecosystem

terminal bud: the bud at the end of a growing stem

taproot: a long, straight, vertical root (like a carrot)

scrub oaks: any of several rather small, shrubby oaks, including turkey, blackjack, bluejack, laurel and shrubby post oak, that usually grow in dry sandy soils along with longleaf pine

germinate: to begin to grow

savannas: Coastal Plain plant communities characterized by parklike, grassy understories with a thin canopy of mostly longleaf pines

firebreaks: trenches dug to help prevent the spread of fire during prescribed burns

prescribed burns: fires intentially set and carefully controlled for the benefit of plant communities that depend upon them

Read and Find Out

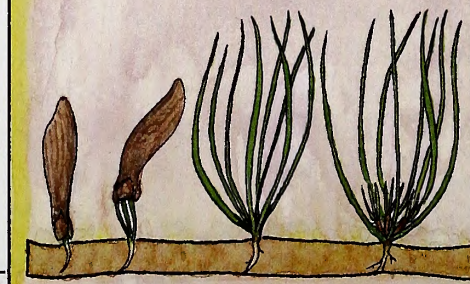
- *The Natural Gardens of North Carolina* by B.W. Wells, The University of North Carolina Press, 1932, 1967.
- *A Stillness in the Pines* by Robert W. McFarlane, W.W. Norton and Company, 1992.

In *Wildlife in North Carolina*

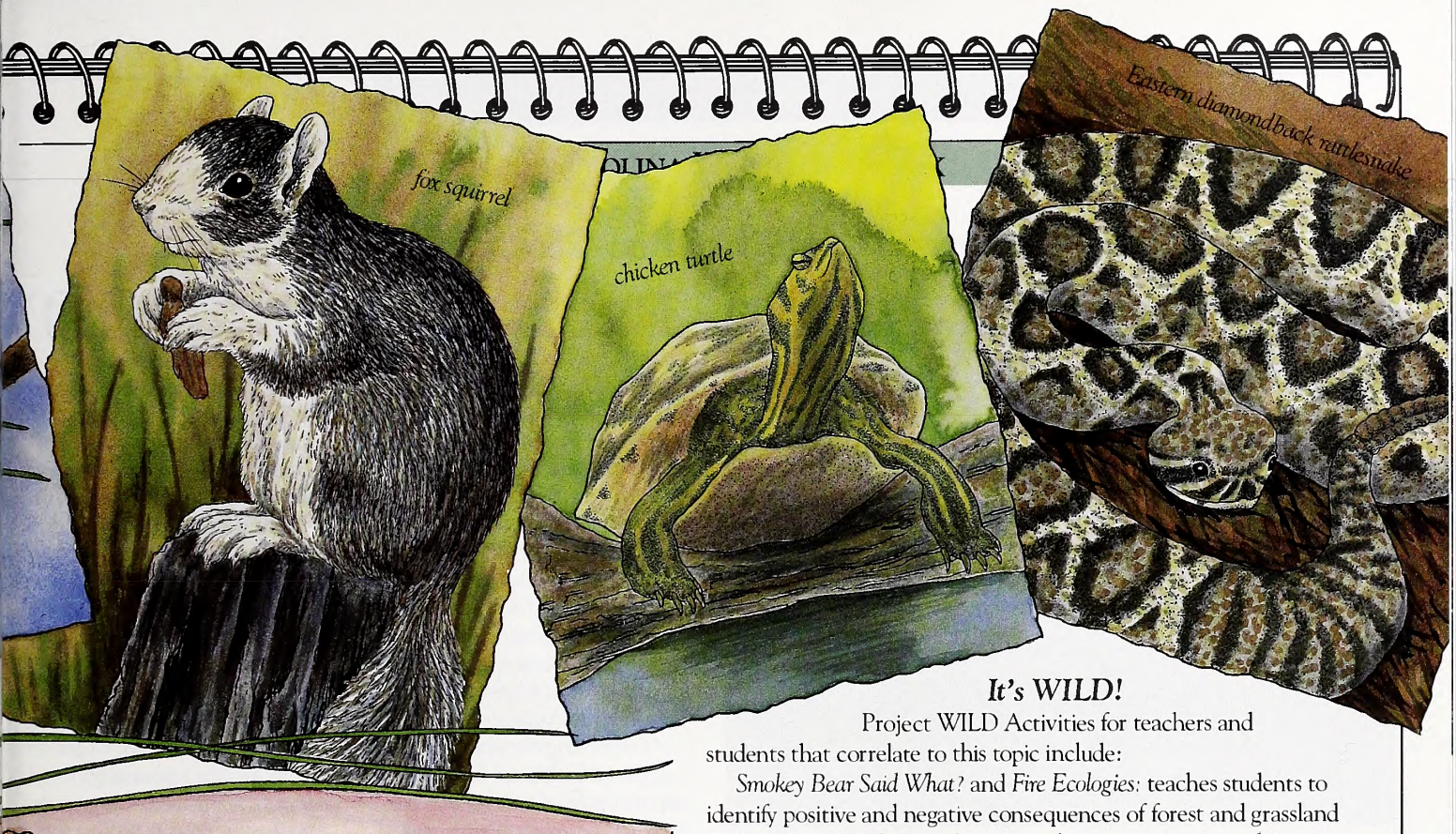
- "Looking for Longleaf" by Lawrence S. Earley, August 1988.
- "Temporary Arrangements" by Lawrence S. Earley, August 1988.
- "Ghosts of the Pinelands" by Garnet Bass, April 1992.
- "Rethinking Fire and Forests" by Vic Venters, November 1992
- "The Fiery Story of Wiregrass" by Lawrence S. Earley, July 1994.
- "The Tree That Came Out of the Shade" by Janet Lembke, August 1996.
- "The Last Turpentiner" by Lawrence S. Earley, June 1997.

No Fire—No Seedlings...

In February the longleaf pines begin to flower. Their male catkins release clouds of yellow pollen. Spring breezes carry the pollen to the tiny female flowers perched along the branches. Two years pass as the fertilized flowers mature into huge pine cones filled with delicate seeds. In the second summer, a small lightning fire burns the forest clear.



Seed develops in winter and spring...



...The Story of a Longleaf Pine Seed

Late in October, the cones open slowly and seeds drift down, landing near the parent tree. Many seeds are eaten, for they are a nutritious food. Some never reach the ground. One seed lands on open soil and germinates, sending a tiny root into the sandy soil. Ashes from the summer fire and winter rains nourish the little seedling. A baby longleaf pine grows.

...by summer, a fire-resistant seedling!

It's WILD!

Project WILD Activities for teachers and students that correlate to this topic include:

Smokey Bear Said What? and *Fire Ecologies:* teaches students to identify positive and negative consequences of forest and grassland fires, to describe changes fire can make in ecosystems, and to understand effects of such fires on wildlife.

Who Fits Here?: teaches students to understand how each ecosystem has characteristic life forms adapted to live there.

Get WILD

Advanced WILD Workshops:

April 21-22 – *Migratory Songbirds*, Morrow Mountain State Park, Albemarle. Contact Mel Porter, (704) 982-1523.

May 6-7 – *Migratory Songbirds*, Howell Woods Environmental Learning Center, Four Oaks. Contact Howell Woods, (919) 938-0115.

Get Outside

Visit a longleaf pine forest: You can still see good examples of longleaf pine communities in several places in our Coastal Plain. These include the Sandhills Game Land, Fort Bragg Military Reservation, Weymouth Woods State Nature Preserve, Croatan National Forest, Bladen Lakes State Forest, Green Swamp Ecological Preserve, Holly Shelter Game Land, Camp Lejeune marine base and Lake Waccamaw State Park. In the Piedmont you can see longleaf pines at the North Carolina Botanical Garden in Chapel Hill.

Things to look for: Look closely at individual longleaf pine trees to notice their long needles and large cones. Can you see any young longleaf pines still in the "grass stage?" What other plants do you see in the forest? Do you see turkey oaks and wiregrass? Do you think this forest has burned recently? Can you see blackened tree trunks or other evidence of past fires? If you are lucky, maybe you'll see a fox squirrel or a red-cockaded woodpecker. The trunks of active woodpecker nest trees are often covered with sticky resin.

Editing and design by Consie Powell. Art puzzle by Anne Marshall Runyon.

Old-Growth Forest Protected for Red-Cockaded Woodpeckers

KEN TAYLOR

The 547-acre Horse Creek Longleaf Pine Forest tract was recently added to the N.C. Wildlife Resources Commission's Sandhills Game Land. In addition to sporting opportunities, the property will provide a corridor between two red-cockaded woodpecker populations.

The N.C. Wildlife Resources Commission's Sandhills Game Land will grow by more than 500 acres as a result of a recent effort to save an old-growth longleaf pine forest containing endangered red-cockaded woodpeckers.

Located in Moore County, the 547-acre Horse Creek Longleaf Pine Forest tract was purchased by The Nature Conservancy for $1.9 million. Partial funding was derived through grants from the Department of Defense and the U.S. Fish and Wildlife Service.

"Protecting the Horse Creek Longleaf Pine Forest creates an important corridor between two disjunct red-cockaded woodpecker subpopulations in the Sandhills," said Fred Annand, associate director of The Nature Conservancy. "We are excited that various public agencies, private organizations and individuals worked together to place this valuable natural area in public ownership."

The land will be turned over to the Wildlife Commission as an addition to the Sandhills Game Land, which includes 58,000 acres of diverse habitat in Moore, Richmond and Scotland counties. As part of the game land, the Horse Creek Longleaf Pine Forest will be open to the public for hiking, nature study and hunting.

Red-cockaded woodpeckers inhabit mature pine forests that typically contain longleaf pines averaging 80 to 120 years old or loblolly pines averaging 70 to 100 years. This species is the only woodpecker that builds nesting cavities in live trees.

The red-cockaded woodpecker has declined dramatically as the Southeast's longleaf pine forests have dwindled. Longleaf pine forests once ranged over 90 million acres from Virginia to Texas. Today, approximately 97 percent of the original range has been cleared for timber, agriculture, residential and golf course development.

"The two existing red-cockaded woodpecker sites on the Horse Creek property have not produced any young birds since 1997," said Bill Parsons, a forester with the N.C. Wildlife Resources Commission. "One of our top priorities will be to attract and maintain breeding pairs for both sites in hopes of producing young birds. This will be done through habitat improvements, such as prescribed burning and the use of artificial cavities."

For more information, contact the Sandhills Wildlife Depot at (910) 281-3917.

—Courtesy of The Nature Conservancy

Funding Received for Riparian Barriers

The N.C. Wildlife Resources Commission recently received two Clean Water Management Trust Fund grants, totaling $4.5 million that will be used to preserve approximately 10,000 riparian acres. One Wildlife Commission project in Hyde County will use several thousand acres of forest lands to filter the runoff from adjacent agricultural lands. The second project will entail the preservation of the buffer to Little Singletary Lake in the lower Cape Fear watershed.

—Courtesy of the Clean Water Management Trust Fund

Field Notes

Rabbit	Through Feb. 29
Bobwhite Quail	Through Feb. 29
Fox	See *Regulations Digest*
Raccoon and Opossum	See *Regulations Digest*
Common Snipe	Through Feb. 28
Ruffed Grouse	Through Feb. 29
Crow	See *Regulations Digest*
Bobcat	See *Regulations Digest*
WATERFOWL	
Snow and Blue Geese	Through March 10

Information on bag limits and other regulations may be found in the *1999-00 North Carolina Inland Fishing, Hunting and Trapping Regulations Digest*. For a copy, check with license agents or contact the N.C. Wildlife Resources Commission at (919) 733-7291. For more information on waterfowl regulations and limits, call 1-800-675-0263.

Edited by Chris Powell

Survey Reveals Roanoke River Striped Bass Worth Almost $1 Million

The Roanoke River striped bass fishery is worth about $1 million to eastern North Carolina economies, according to a recent survey completed for the N.C. Wildlife Resources Commission.

To determine the economic benefits of the Roanoke River striper fishery, the Wildlife Commission recently requested the survey be performed by Peter Schuhmann, an economist at the University of North Carolina at Wilimington. Fisheries biologists handed out 1,800 questionnaires to fishermen at Roanoke River boat ramps during striper season, and about 600 forms were returned. Among the questions asked the anglers were how much they spent on gas, bait, food and lodging to fish for stripers.

According to the results, Roanoke River anglers spent approximately $918,000 on fishing trips during 75 days of the 1998 striped bass season. The average catch-and-keep angler incurred $22 in expenses per trip, while the average catch-and-release angler spent $115 per trip. When asked how much more they would have been willing to pay for their fishing trips, striped bass anglers indicated they would have been willing to pay an additional $800,000.

"Some people said they would have been willing to pay $25 more to catch stripers, some said $50 more; others said they would have paid whatever it took," said Pete Kornegay, a fishery research coordinator with the Division of Inland Fisheries.

To determine total economic impacts of fishery resources, economists add trip expenditures and "willingness to pay" values. These values totaled more than $1.7 million. The results of the survey could be used by the Wildlife Commission or other government officials who are faced with habitat degradation issues.

MELISSA McGAW

Anglers, like the ones shown, spend upwards of $1 million each spring to fish for stripers on the Roanoke River.

"We want people who make decisions that could potentially affect fisheries to know that these resources are not without value to their local economies," Kornegay said. "Although not included in our study, these fish migrate into Albemarle and Pamlico sounds where both recreational and commercial fisheries occur. This positively impacts economies in many coastal North Carolina counties."

North Carolina's Albemarle/Roanoke River striper fishery was declared recovered in 1997.

—Chris Powell

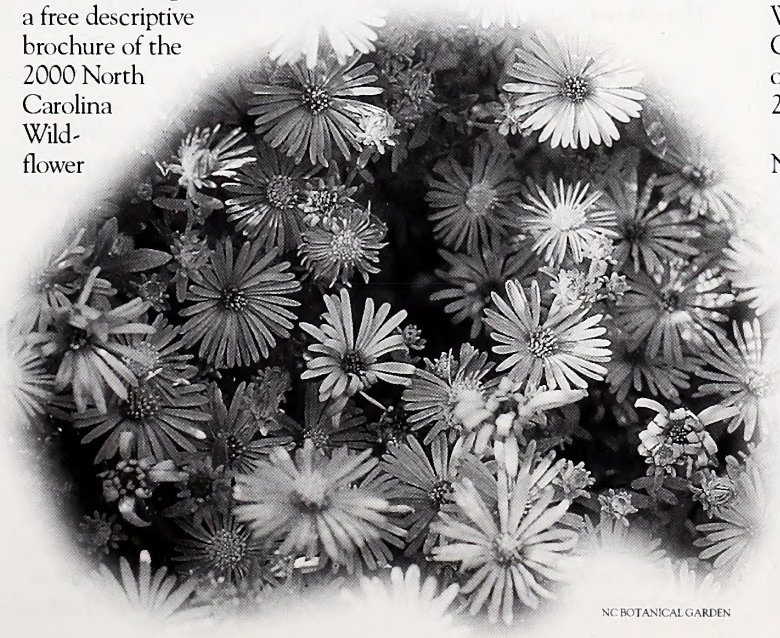
Eastern Aromatic Aster Named Wildflower of the Year

The Eastern aromatic aster was recently named the 2000 North Carolina Wildflower of the Year by the North Carolina Botanical Garden.

The Eastern aromatic aster (*Aster oblongifolius*) is considered one of the most beautiful of North Carolina's native asters. It is smothered with hundreds of blue-purple flowers with complimentary central disks of yellow that mature to a purple-bronze.

It is an uncommon species in North Carolina, occurring in one or two of our western-most counties. The wildflower naturally grows on cliffs in soil and blooms the first week of October. Its leaves have a piney fragrance when rubbed between the fingers.

This adaptable native will grow in a wide variety of garden situations, provided it receives sufficient sunlight. To receive a free descriptive brochure of the 2000 North Carolina Wildflower of the Year, which includes a package of Eastern aromatic aster seeds and germination instructions, send a stamped, self-addressed business-size envelope to: 2000 WFOY, N.C. Botanical Garden, Campus Box 3375, University of N.C., Chapel Hill, N.C. 27599-3375.



NC BOTANICAL GARDEN

Now in its 19th year, the North Carolina Wildflower of the Year Program is a cooperative conservation endeavor between the Garden Club of North Carolina Inc. and the North Carolina Botanical Garden, a part of the University of North Carolina at Chapel Hill. The program's purpose is to promote a greater appreciation of native plants and their conservation.

—Courtesy of the North Carolina Botanical Garden

On Patrol

Editor's note: *While most North Carolina sportsmen are law abiding, a few are not. Listed below is a report of a wildlife violation that exemplifies the humorous, and at times bizarre, situations our North Carolina wildlife enforcement officers encounter while on patrol.*

Sgt. Anthony Sharum and officers Mark Minton and Mitchell Little recently worked a deer-decoy detail in Davidson County that unfolded like a scene out of the Wild West. A man spotted the decoy in his headlights and watched it for several minutes before exiting his truck with a pistol in hand. Officer Minton was stationed about 75 feet away and could see that the man was trying to shoot at the decoy, but couldn't get the pistol to fire. With the gun still outstretched in his hand, the man ran toward the deer decoy. (He must have thought the deer would see the gun and surrender.) When the man finally realized the deer was a fake, he snatched up the decoy and ran back, throwing it into the bed of his truck. He attempted to speed away, but wildlife officers were waiting, and the decoy was soon liberated. The pistol, which was loaded, was found to have malfunctioned. The man was charged with hunting before legal shooting hours and larceny of state property. (No kidnapping charges were filed.)

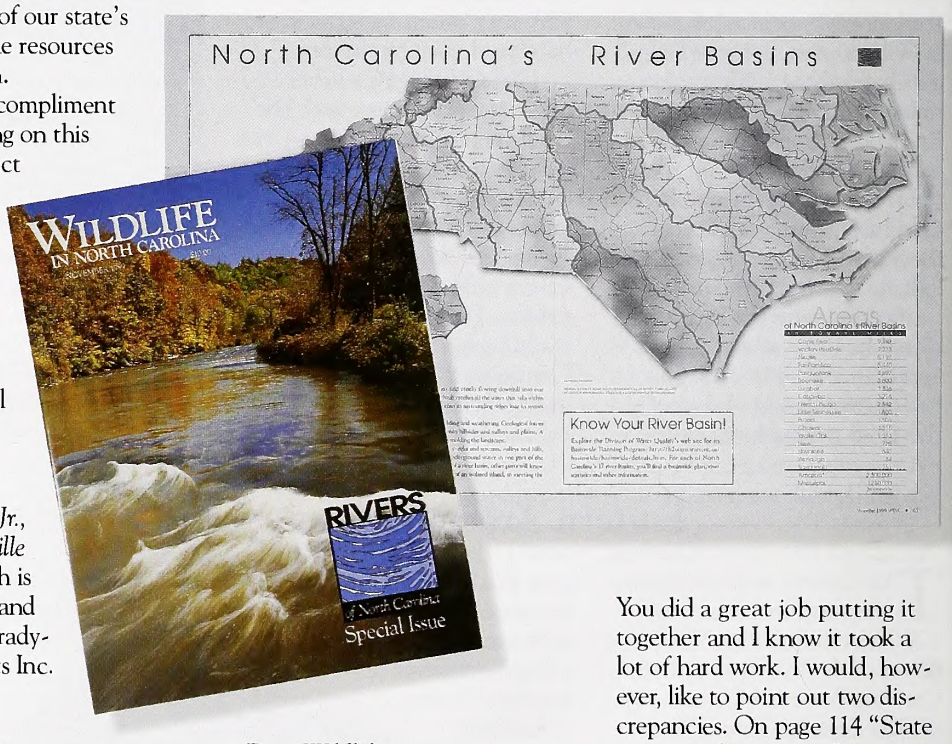
About "Rivers of North Carolina" Special Issue

Dear Wildlife:

Just a note to congratulate you and your entire staff on the special issue of *Wildlife in North Carolina*, "Rivers of North Carolina." I thought the issue came out very well, and I sincerely hope that we will be able to put them in the hands of many people young and old throughout North Carolina in hopes that they can become better educated about the importance of our state's rivers and the resources they contain.

Again, I compliment you for taking on this special project and for the finished product which can and should be used as a teaching tool for years to come.

Eddie Smith Jr., Greenville
Smith is chairman and CEO of Grady-White Boats Inc.



Dear Wildlife:

You should be very proud of the publication, for it is extremely well done! If this particular issue is any indication, then it is easy to understand why *Wildlife in North Carolina* has been judged best magazine among its state peers nationwide. The state is fortunate to have such a high-quality magazine.

Stella A. Trapp, Brevard

Dear Wildlife:

I have been a lifetime subscriber for some time and enjoy your publication. The November 1999 special issue on "Rivers of North Carolina," however, was an extraordinary reading experience for me.

It is apparent that a lot of work went into preparing this issue, and I want to thank you for an interesting and informative publication.

John O. Berry, Olney, Ill.

Dear Wildlife:

I thoroughly enjoyed the concise and informative pieces about our major rivers systems in North Carolina.

I want to note that your list of statewide groups and organizations interested in water quality protection failed to include Save Our State. We are a new organization, but thanks to the many prominent members of the group, we have had an active and successful first year educating the media and public officials on pressing environmental issues, and helping to push for environmental policies ranging from animal waste treatment systems to air pollution.

Keep up the good work.

Alan Briggs, Raleigh
Briggs is the executive director of Save Our State.

Dear Wildlife:

Thank you for the extra copies of "Rivers of North Carolina". You did a great job putting it together and I know it took a lot of hard work. I would, however, like to point out two discrepancies. On page 114 "State water-quality experts" are referred to instead of "State water-resources" experts in the segment on North Carolina Rivers Assessment (NCRA), which is a program within the Division of Water Resources. Also, on page 118, Stream Watch is stated as being managed through the Division of Water Quality. Stream Watch is managed through the Division of Water Resources.

David Wojnowski, Raleigh
Wojnowski is the Stream Watch/Project WET coordinator

Wildlife Commission Takes Award for Best State Fair Exhibit

For the second year in a row, the N.C. Wildlife Resources Commission has been recognized by the Department of Agriculture for having the Best Non-Commercial Exhibit in the State Fair.

The theme of the 1999 exhibit was "Year of the Rivers," which the N.C. Department of Environment and Natural Resources declared for the year 2000. The exhibit tent included an educational walkway around maps, diagrams and pictures that described the environmental, recreational and social significance of North Carolina's rivers.

The exhibit tent also contained a manmade stream and pond stocked with bass, bream, catfish and carp. In addition, the exhibit tent featured an information station where wildlife biologists were available to answer questions from the public. A WILD Store booth was also used to sell conservation education products and promote *Wildlife in North Carolina* magazine's special "Rivers of North Carolina" issue, which was published in November.

NC DEPARTMENT OF AGRICULTURE AND CONSUMER SERVICES

The N.C. Wildlife Resources Commission won Best Non-Commercial Exhibit during the 1999 North Carolina State Fair, held in October. Wildlife Commission photographer Ken Taylor (right) who supervised design and construction of the exhibit, receives congratulations and a plaque from Jim Graham, commissioner of the N.C. Department of Agriculture.

Wildlife in North Carolina photographer Ken Taylor, who has supervised the design and construction of the exhibit for the past two years, said production of the exhibit was a team effort among all the Wildlife Commission's divisions.

"The State Fair exhibit is an opportunity to showcase the work being done by the Wildlife Commission that is not always obvious to the public, but is still vitally important," Taylor said.

The State Fair is held every October at the State Fair Grounds in Raleigh. The event attracted more than 690,000 people in 1999.

—Chris Powell

Tips

Frying Fish in Cold Weather

There's nothing like a good piece of hot fried fish on a winter's day. But because fried fish can smell up a house, many people like to cook outside. Here's an easy way to keep the fillets warm without making constant trips into the house. After removing the fried fish from the cooking oil, place them in a small lunchbox-size cooler lined with paper towels, and quickly close the lid. You will be amazed how hot the fish remain, even after lengthy periods. The same technique can be used during the summer to keep the fish away from pesky flies.

—Della Powell, Newport News, Va.

Editor's note: *Do you have a tip or suggestion you would like to share with our readers? If so, please write Chris Powell at 1712 Mail Service Center., Raleigh, N.C. 27699-1712; Fax: (919) 715-2381; E-mail: (powell.chris@coned.wildlife.state.nc.us)*

Outdoor Calendar of Events

On several occasions, events in this calendar have been changed without notice. Readers should check with the contact listed before traveling to an event. Items for listing should be conservation oriented and should be sent at least four months in advance.

Feb. 19

The Pisgah Center for Wildlife Education, located near Brevard, will conduct the Salamanders – Some Like It Cold program from 1:30 to 4:30 p.m. Consisting of a slide show and time for hands-on collecting, this course provides participants with an introduction to salamander indentification and ecology. The program is suitable for all ages. For more information, call (828) 877-4423.

Feb. 19

The North Carolina Bowhunters Association will conduct its 14th annual convention and awards banquet at 9 a.m. in Burlington. The convention will be held at the Ramada Inn of Burlington, and admission will be $3 for adults and free for children 17 and under. The convention will feature hunting seminars and a variety of archery- and sporting goods-related vendor booths. The convention ends at 4 p.m. and is followed by the association's awards banquet, auction and dinner. Admission to the auction is free, but $15 meal tickets must be purchased in advance. For more information, call Kathy Carroll at (919) 693-2560 or John Vargo at (336) 665-1222.

Feb. 29

The Pisgah Center for Wildlife Education, located near Brevard, will conduct the Eco-Explorers – Salamanders program from 9:30 a.m. to noon. Eco-Explorers is a program series for children ages 7 to 12. Each program focuses on a different eco-investigation. For more information, call (828) 877-4423.

Catch Us at These Numbers

- **1-800-662-7137** to report violations of hunting and fishing laws.
- **1-800-628-3773** (NC VESSEL) for boat registration and titling.
- **1-800-675-0263** for hunting dates and shooting hours for migratory game birds.
- **1-888-248-6834** (2HUNTFISH) to purchase most licenses with VISA or MasterCard using a touch-tone telephone.
- **1-800-446-8663** (I GOT ONE) to report big game harvests.
- Connect to the Commission's online web site at **http://www.state.nc.us/Wildlife/**

The N.C. Wildlife Resources Commission maintains five toll-free telephone numbers to provide better services and convenient access to information for North Carolina citizens. Calls are answered in order, but some numbers may require a wait during busy seasons.

VISA MasterCard

Wildlife Endowment Fund Report

Totals Through November 1999

Principal Balance
$28,860,736.95

Interest Earned
$29,694,809.95

Total Receipts
$58,555,546.90

Interest Used
$18,100,819.04

Fund Balance
$40,454,727.86

Established on May 29, 1981, this fund is derived from the sale of lifetime hunting and fishing licenses and lifetime subscriptions to *Wildlife in North Carolina* magazine as well as from tax deductible contributions. While the interest may be used to supplement N.C. Wildlife Resources Commission programs, the principal remains invested to generate additional interest for the future.

February Improvements

by Rodney Foushee

Thought about making improvements for fish and wildlife on your land only to realize you've waited too long and let spring slip up on you? Now is the time to begin making your property more productive for wildlife.

Planting Lespedeza: February is the perfect time to plant annual lespedeza. These legumes provide a winter food supply for quail and other small birds, and also make good forage for rabbits because of their heavy seed production. The growing plants also provide habitat for insects, which in turn provide protein for young birds during the summer.

Lespedeza seeds should be broadcast onto bare soil where late frosts and spring rains can work the seeds in. Because no tilling or fertilizer is required, planting lespedeza can be as simple as tossing out a few handfuls of seed for a small plot.

Logging roads and others clearings are excellent sites for planting lespedeza. Annual lespedezas have a much more difficult time taking hold in areas with well-established groundcovers. Lespedeza should be seeded at rates of 10-15 pounds per acre. But even a few pounds of seed will go a long way, provided there is good habitat and cover nearby.

Kobe and Korean lespedeza seeds are available at most feed stores for about a dollar a pound. A free list of commercial sources for wildlife planting materials is also available from the Wildlife Commission. Write: N.C. Wildlife Resources Commission, Division of Wildlife Management, 1722 Mail Service Center, Raleigh, N.C., 27699-1722; or call (919) 733-7291.

Water Testing: Now is a good time to test the water quality of your farm ponds in preparation for fertilizing them later in the season. Fertilization can dramatically boost production in your ponds if the water is not soft or acidic. By testing the water now for hardness and pH, you can determine whether you'll need to apply lime before fertilizing this spring. Inexpensive water-testing kits are available from swimming pool supply centers and pet stores. Your local district fisheries biologist can also provide assistance. For more information, call (919) 733-3633.

Planning Dove Fields: Late winter is an excellent time to make arrangements with farmers to plant dove fields. The key is to set aside field corners and borders for wildlife before the planting season arrives. That way, last year's dream food plot will be a reality this year.

N.C. WILD STORE

RARE HABITATS

water-quality issues

Indian remains

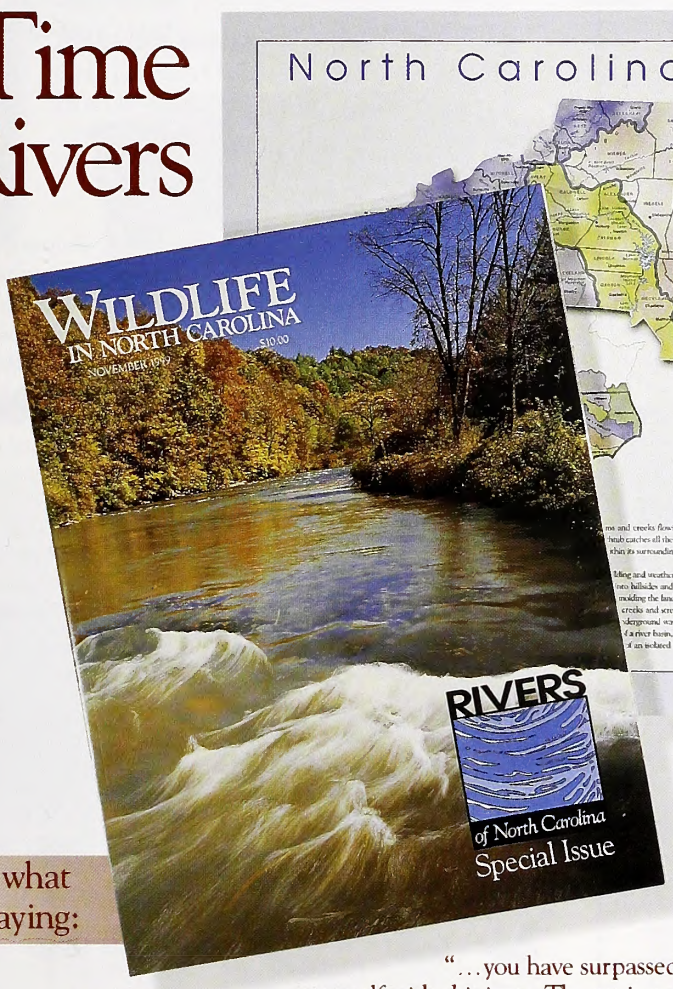
early explorers

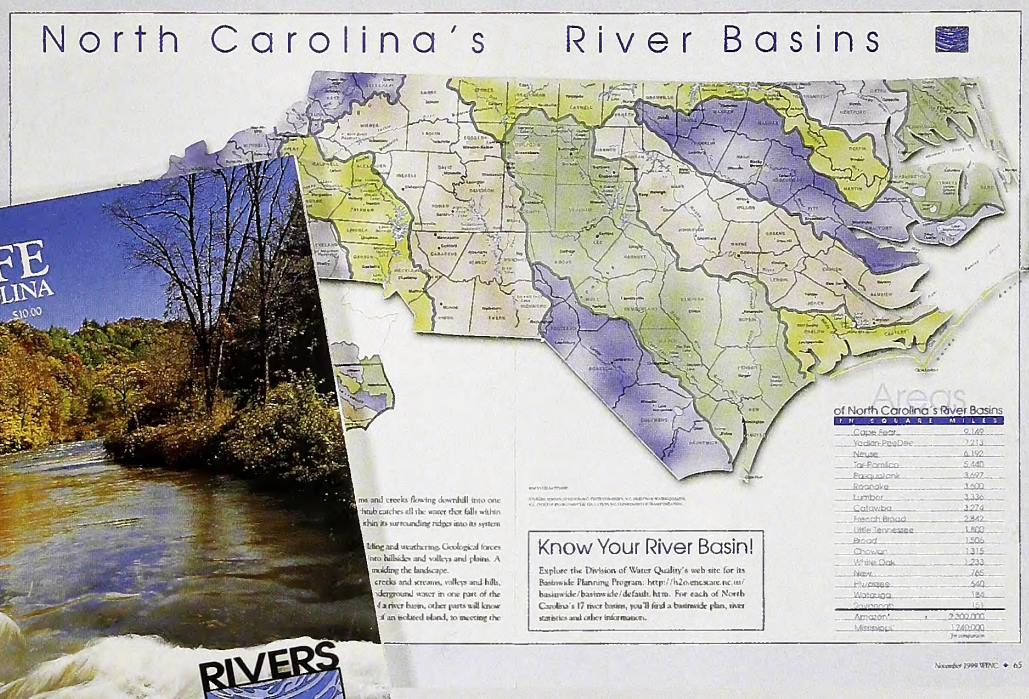
the secret life of animals

canoe trips

the real-life stories of people working to clean our rivers

A Time for Rivers





Here's what they're saying:

"...you have surpassed yourself with this issue. The art is not just beautiful but illustrative and informative; the photos and charts and sketches of the river basins are put together with a wonderful sense of composition to enhance the articles. ["Rivers of North Carolina"] is a classic."
—Philip Gerard, author of *Cape Fear Rising*

"With excellent writing, photos, and maps, the [special issue] is a beautiful gift to all of us, as well as a wonderful teaching tool for all ages. What a great way to bring in the Year of the Rivers - 2000 celebration!"
—Peg Jones, executive director, North Carolina Watershed Coalition

You'll experience all of these and much more in "The Rivers of North Carolina," a 128-page special issue of *Wildlife in North Carolina*. For timely coverage of all of North Carolina's river basins, as well as eye-catching photos and educational maps and graphics, there's nothing else like it on bookshelves anywhere.

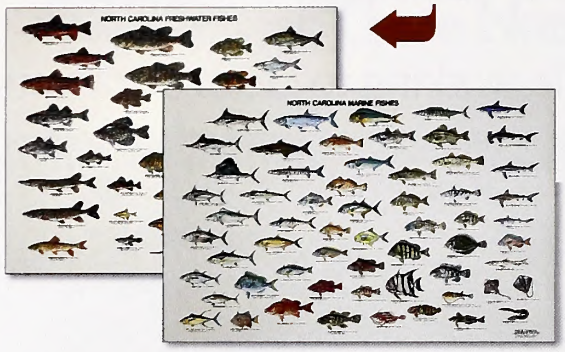
Order "Rivers of North Carolina" today for your own bookshelf, or give it to friends and family members to enjoy. For $10, plus shipping and postage, you'll have a coffee-table edition that's already being hailed as a classic.

Item Code M11 $10

All proceeds from the sale of these products support the development and production of conservation education projects and programs.

N.C. WILD STORE

North Carolina's freshwater fish and marine fish are colorfully displayed on individual posters, and feature the art of Duane Raver. Reel yours in today!



Fishes of North Carolina

Set of 2. Freshwater fish poster shows 36 state species (size 28" x 22½"). Marine fish poster shows 60 species (size 35" x 22½") $10.

ITEM CODE **P9**

Nature's Ways Collection

Explore the wonders of the natural world, wildlife species and ecosystems through "Nature's Ways." More than 200 essays from *Wildlife in North Carolina* have been compiled in a beautiful 6-volume paperback set. $27.50.

ITEM CODE **M9**

Also available as a boxed set. $30.

ITEM CODE **M10**

Before going on your next outdoor hike or camping trip, be sure you know North Carolina's reptiles.

Reptiles of North Carolina

Set of 4 posters in full color. Each poster decribes the species and denotes which reptiles are on the endangered, protected or special concern list. A set includes: lizards, turtles, and both live-bearing snakes and egg-laying snakes. Posters are sized 22" x 34". $18. ITEM CODE **P10**

Amphibians of North Carolina

The Hylid Frogs. North Carolina's tree frogs, cricket frogs and chorus frogs, belonging to the large family *Hylidae*, are presented in this colorful poster, one of two frog posters in the Amphibians series. 22" x 34". $6.

ITEM CODE **P11**

Amphibians of North Carolina

True Frogs and Toads. The second poster in the Amphibians series showcases true frogs and toads. Vibrant photos combine with informative text to make it a standout in the classroom or at home. 22" x 34". $6.

ITEM CODE **P14**

Waterfowl Decoys of N.C.

Nineteen classic waterfowl decoys from North Carolina's legendary days of waterfowl hunting have been collected for the first time on this framable, high-quality poster. This is the first in a series of "Sporting Heritage" posters. 22" x 34". $10.

ITEM CODE **P12**

Traditional Trout Flies of the Southern Appalachians

Sixteen traditional trout flies are presented in stunning color detail. Each fly is accompanied by a brief history of its development and use in Appalachian waters as well as the components that make up each hand-tied creation. Second in a series of "Sporting Heritage" posters. 22" x 34". $10. ITEM CODE **P13**

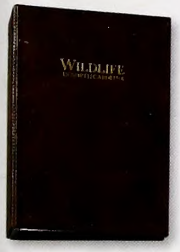
Bird Houses & Feeders: How to Build and Enjoy Them

An eight-page illustrated guide to building bird houses and feeders. $2.

ITEM CODE **M6**

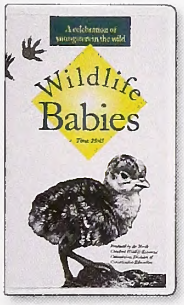
Dogs that Point, Fish that Bite

Here are 50 of the best "Our Natural Heritage" columns written by Jim Dean for *Wildlife in North Carolina* over the past 17 years. Published by the University of North Carolina Press and the N.C. Wildlife Resources Commission. Hardbound. 220 pages. **$19.95.** ITEM CODE **M8**



Magazine Binder

Store 12 issues of *Wildlife in North Carolina* in a sturdy binder. **$10.**
ITEM CODE **M2**



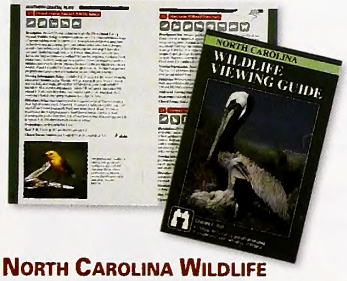
Wildlife Babies Video

Entertaining 25-minute video version of the classic 1965 Jack Dermid film reveals springtime antics of young wood ducks, black bear, possums, cottontails and others . **$20.**
ITEM CODE **N9**

Based on Chief Seattle's 1855 speech, the film's focus is on environmental ethics. Accompanied by This Land Is Sacred, this film is a must-see for everyone. It is destined to become a classic.

All Things Are Connected

Video and Activity Guide. **$22.**
ITEM CODE **W3**



North Carolina Wildlife Viewing Guide

From Cape Hatteras to the Great Smokies, *North Carolina Wildlife Viewing Guide* will lead you to 90 of the state's premier wildlife viewing locations—and better your chances of seeing wildlife once you get there. **$5.95.** ITEM CODE **N6**

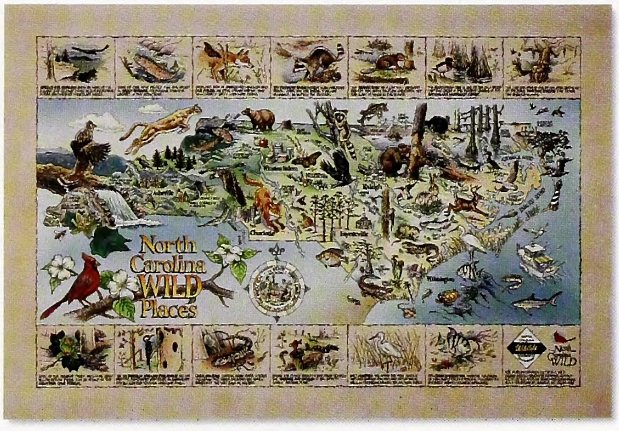
Gardens for Butterflies

Article reprint from *Wildlife in North Carolina* magazine for the gardener who wants to attract some of nature's most colorful creatures. **$2.** ITEM CODE **M5**

Scouting Correlations

Cub, Boy and Girl Scout requirements are correlated to Project WILD and Aquatic WILD activities. Supplements Scout leaders' planning materials and events. Each **$3.**
Cub & Boy Scout Correlation. ITEM CODE **E9**
Girl Scout Correlation. ITEM CODE **E10**

North Carolina's wildlife habitats come alive in this 82-page, easy-to-read, soft cover book. With delightful illustrations by Anne Marshall Runyon, N.C. WILD Places covers 13 habitats across the state.



North Carolina WILD Places: A Closer Look

Book and Posters Set. With each book you'll receive two habitat posters (also by Runyon) and a N.C. WILD Places Map poster, featuring the art of Jackie Pittman. **$16.** ITEM CODE **E6**

North Carolina WILD Places Teacher's Guide

For teachers using *North Carolina WILD Places* in the classroom, these activities and games will heighten student awareness of wildlife habitats. **$6.**
ITEM CODE **E7**

More terrific items ☛

N.C. WILD STORE

Top-quality, 3-ring binder holds 120 WILDlife Profiles. Custom-made binder comes with a table of contents, tab dividers to organize Profiles by classes, an index and 120 fact sheets.

WILDLIFE PROFILES BINDER & WILDLIFE PROFILES SETS 1-12

Binder features clear overlay cover, 1 1/2" capacity and inside literature pockets. See the list of species profiled below. $30. ITEM CODE W17

Set 1. Black bear, raccoon, white-tailed deer, striped skunk, bobwhite quail, wild boar, muskrat, mourning dove, coyote, mallard.

Set 2. Mink, canvasback duck, red fox, wild turkey, beaver, American river otter, Canada goose, bobcat, red wolf, cougar.

Set 3. Humpback whale, black duck, osprey, clapper rail, red-shouldered hawk, cottonmouth, diamondback terrapin, largemouth bass, black crappie, channel bass.

Set 4. Brook trout, garden spider, Tar spiny mussel, wood duck, bullfrog, mayfly, tiger salamander, bog turtle, hellbender, shortnose sturgeon.

Set 5. Cottontail rabbit, gray squirrel, northern flying squirrel, newt, common crow, red-tailed hawk, prothonotary warbler, bluegill, striped bass, Eastern oyster.

Set 6. Opossum, peregrine falcon, Eastern bluebird, American toad, rat snake, Eastern glass lizard, smallmouth bass, brown trout, monarch butterfly, Virginia big-eared bat.

Set 7. Chipmunk, gray fox, bald eagle, loggerhead shrike, common snapping turtle, five-lined skink, bluefish, rainbow trout, grasshopper, horseshoe crab.

Set 8. Appalachian cottontail, manatee, barred owl, turkey vulture, Neuse River waterdog, spring peeper, coral snake, American alligator, American eel, American shad.

Set 9. Southern flying squirrel, fox squirrel, great horned owl, snowy egret, Southern leopard frog, corn snake, Atlantic sturgeon, walleye, luna moth, crayfish.

Set 10. Marsh rabbit, woodchuck, hooded warbler, whippoorwill, green salamander, copperhead, fence lizard, muskellunge, chain pickerel, Scotch bonnet.

Set 11. Atlantic croaker, Southern flounder, summer flounder, spot, king mackerel, Spanish mackerel, sea mullet, weakfish, spotted seatrout, striped mullet.

Set 12. Bay scallop, black sea bass, blue crab, brown shrimp, spiny dogfish and smooth dogfish, gag, hard clam, menhaden, sandbar shark, white perch.

INVENTORY BLOWOUT! 50% off when you order Sets 1 through 10 inclusive. $10. ITEM CODE W4-S. (Does not apply to purchase of individual sets. Offer expires Dec. 31, 1999.)

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Wildlife in North Carolina Caps. Exclusive designs and magazine logo are featured on three different cap styles. $16.50 each.

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100% cotton natural color tee with design on back and Pisgah logo on front. $14.50.
ITEM CODES:
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Just like the adult shirt with Pisgah design, only smaller.
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WILDLIFE IN N.C. T-SHIRT

WINC magazine logo on front pocket. Tundra swan art on back. White. $14.50. ITEM CODES:
A5MED (medium)
A5LRG (large)
A5XLG (extra large)
A5XXL (extra extra large)

N.C. WILD T-SHIRT

N.C. WILD logo printed on front and colorful art on back. White. $14.50. ITEM CODES:
A4MED (medium)
A4LRG (large)
A4XLG (extra large)
A4XXL (extra extra large)

WILDLIFE COMMISSION SPOTLIGHT

Cleaning Up Muddy Creek

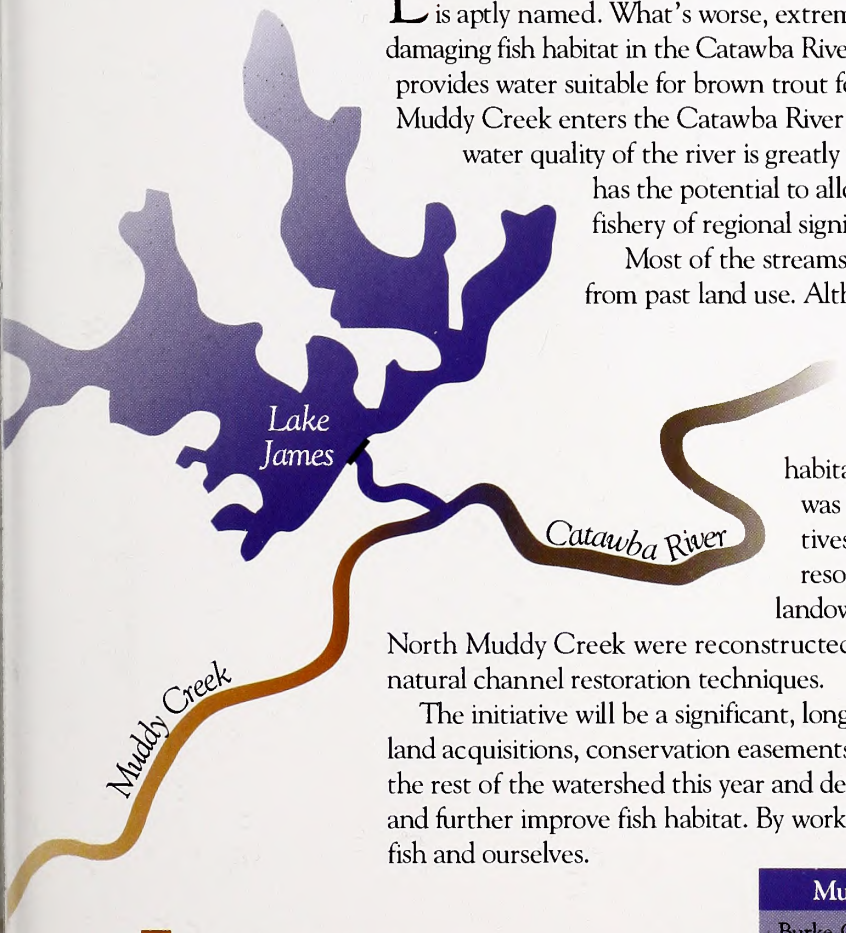
CHRIS GOUDREAU

Located in Burke and McDowell counties in the North Carolina foothills, Muddy Creek is aptly named. What's worse, extremely high sediment loads from Muddy Creek are damaging fish habitat in the Catawba River. Cold, clear water from the bottom of Lake James provides water suitable for brown trout for 18 miles of the Catawba below the dam. But as Muddy Creek enters the Catawba River just 1 mile downstream of the Lake James dam, the water quality of the river is greatly reduced. Restoration of the Muddy Creek watershed has the potential to allow the Catawba River to support a cold-water tailrace fishery of regional significance.

Most of the streams in the Muddy Creek watershed have been impacted from past land use. Although there is a relatively good riparian corridor, creek banks continue to erode, stream channels have become entrenched and the streams have become disconnected from the flood plain.

In order to restore the watershed and improve fish habitat, the Muddy Creek Watershed Restoration Initiative was begun in 1998. This partnership includes representatives from the Wildlife Resources Commission, other resource agencies, local industry, local governments and landowners. More than 1,500 feet of the worst sites along North Muddy Creek were reconstructed through the partnership in October 1999 using natural channel restoration techniques.

The initiative will be a significant, long-term effort involving stream restoration projects, land acquisitions, conservation easements and public education. Fisheries biologists will assess the rest of the watershed this year and determine the right mix of practices to reduce sediment and further improve fish habitat. By working together, we CAN clean up Muddy Creek for the fish and ourselves.



- Sediment-laden water
- Clean water (suitable for brown trout)
- Potential cold-water tailrace fishery

Muddy Creek Watershed Restoration Initiative Partners

Burke County • Duke Energy • McDowell County • National Fish and Wildlife Foundation • North Carolina Clean Water Management Trust Fund • North Carolina Cooperative Extension Service • North Carolina Wildlife Resources Commission • The Natural Resources Conservation Service • The Foothills Conservancy of North Carolina • Trout and Salmon Foundation • Trout Unlimited • Vulcan Materials Company

On Point!

Classy Champion Zip Zap, a multiple winner in open and amateur shooting dog stakes, locks onto a point at a field trial in North Carolina. Field trials offer chances for dogs and hunters to hone their skills. Story on page 4.

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CONOVER, NORTH CAROLINA

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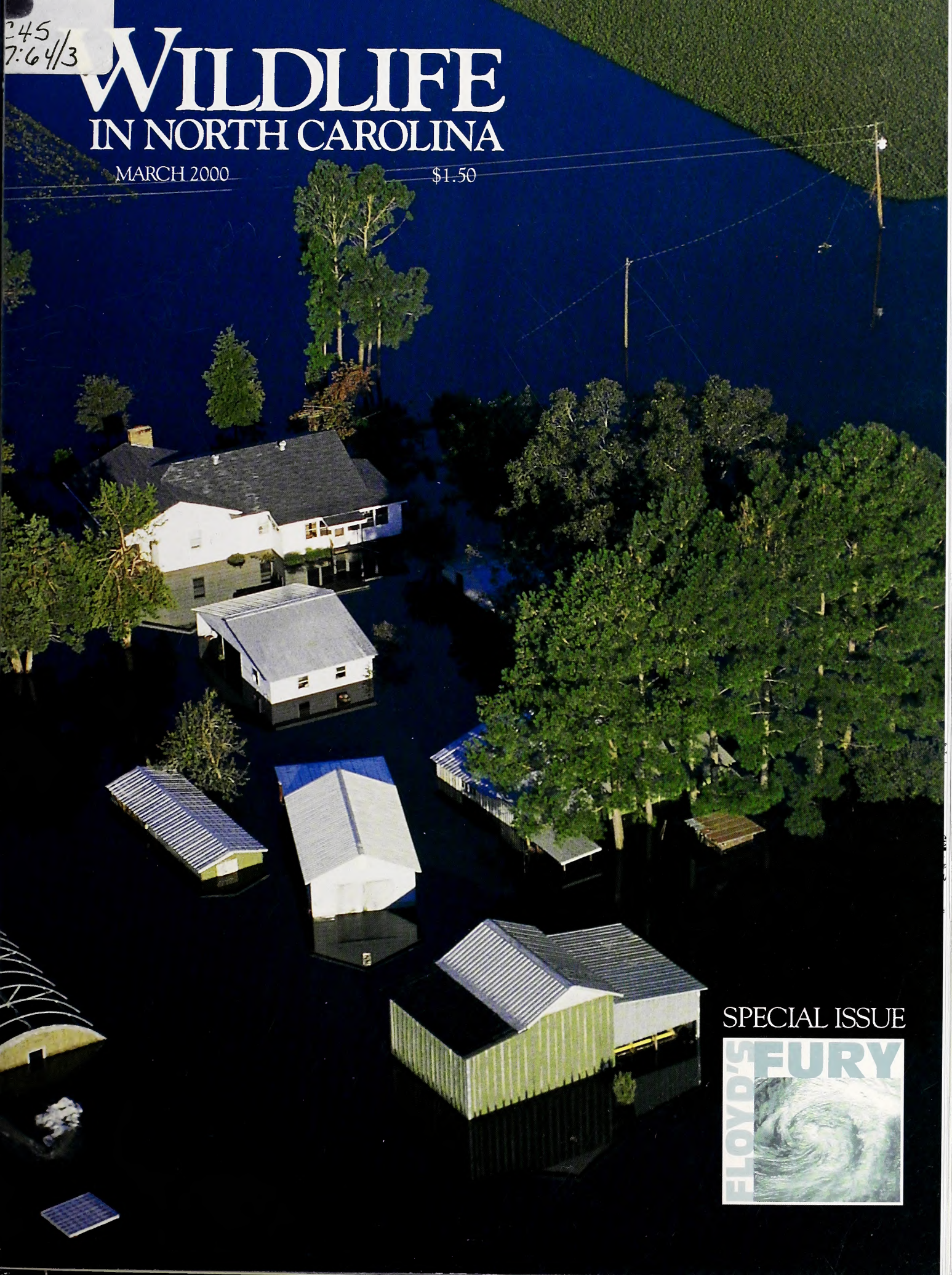


SPECIAL ISSUE

Mill Pond Lunkers

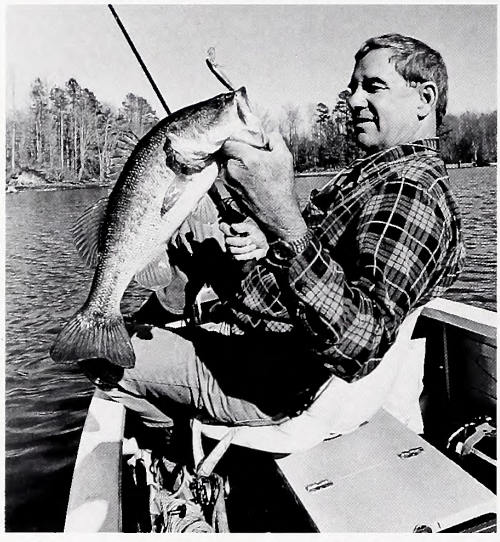
by Jim Dean ©2000

"That's the fishiest-looking water I've ever seen," I said as we drove slowly along the road that skirted the old pond and crossed the bridge that spanned the creek just below the dam. The abandoned remains of the gristmill stood to one side nestled against the dam, but the big water wheel was long gone.

"Too bad looks can be so deceiving," said Jack Avent. "Don't get your hopes up."

"Now when have I ever gotten my hopes up?" I replied, laughing.

"Only every time we go fishing," Jack said.



JIM DEAN

We slid the small johnboat into the water and began to load our gear.

"So why is it that we spend so much time fishing these old spots," I said as we tied on our lures and headed up the lake. We quickly lost sight of the mill in a watery forest of cypress and tupelo shrouded in Spanish moss. The water was the color of strong tea where we passed over a sandy bar. Here and there were patches of lily pads and the surface was matted with duckweed along the edges where the trees were as thick as mangroves. A prothonotary warbler flashed bright yellow against the foliage and redwing blackbirds greeted us with raspy calls.

"Because it suits us," he said after a moment's reflection. My question had, after all, been largely rhetorical. "And," he added, "because if we do catch a big bass, it will be one we will never forget."

True enough, on both counts. Jack and I are about the same age, and some of our earliest memories are of fishing such ponds. For me, that was some 50 years ago when my grandfather first began to take me with him to fish an old millpond in Halifax County. There were very few huge lakes in North Carolina then—no Kerr, Gaston, Jordan, Norman or similar artificial impoundments. If you fished, your choices were more likely to be a river, municipal water supply, old mill pond or similar small lake. You paid 50 cents to fish and another two bits to rent an old leaky wooden boat.

"Some of the appeal is obvious. These waters combine solitude and unparalleled beauty with the old-fashioned feel of classic bass fishing."

Nowadays, bass fishing is very different and, in some ways, it has never been better. The creation of many large lakes across North Carolina in mid-century set the stage for modern bass fishing. Tournament fishing introduced high-tech electronics and vastly improved boats, tackle and techniques, but the increased fishing pressure has been offset by improved fisheries management (especially the introduction of forage fish). Judicious regulations and a catch-and-release ethic popularized by tournament fishermen have also helped. These lakes grow lots of trophy bass and, of course, that's where nearly everyone fishes.

Jack and I also fish the big lakes but, to be honest, we frequently prefer the charm and challenge of those smaller, older ponds and lakes. Some of the appeal is obvious. These waters combine solitude and unparalleled beauty with the old-fashioned feel of classic bass fishing. Except for a few elderly fishermen soaking worms or minnows for bream or crappies, you'll likely have it all to yourself—no rooster-tailing bass boats, no jet skis. While some old mill ponds have been developed or drained, there are still a lot of them scattered about the state.

And what about the bass fishing? Because most of these lakes are very old—some well past the century mark—their fish populations have long since achieved a natural balance of mostly non-gamefish and countless stunted panfish. Furthermore, most are poorly managed and the water is often tannic and relatively infertile. Largemouth bass populations tend to be low, but the bass that survive to reach adulthood have lots of food and little competition for it. You seldom catch lots of fish, but a few bass may grow to outlandish sizes.

A dozen years ago, Jack and I were fishing an old mill pond when I made a cast to the end of an ancient boat house and hooked what is surely the biggest largemouth I've ever had on my line. It was easily more than 10 pounds—Jack thought it might go 12—but we will never know because it jumped twice and tossed the lure. Characteristically, it was the only strike I had that day, but that's the bass that haunts my dreams.

One more thing. These mill pond whoppers may make only one mistake a year, but they most often make it in late winter or early spring. That's the best tip I can give you if you're looking for a bass Jack says you'll never forget.

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Wildlife in North Carolina is the official educational publication of the North Carolina Wildlife Resources Commission. It is dedicated to the sound conservation of North Carolina's wildlife and other interrelated natural resources and also to the environment we share with them.

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Cover *A familiar scene by now, floodwaters from Hurricane Floyd cover this farmstead in eastern North Carolina. Photograph by Melissa McGaw.*

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MAR 2000
STATE LIBRARY OF NORTH CAROLINA

Wildlife in North Carolina (ISSN 0043-549X) is published monthly by the North Carolina Wildlife Resources Commission, 512 N. Salisbury St., Raleigh, N.C. 27604-1188. Periodicals postage paid at Raleigh, N.C. and additional mailing offices. Subscription rates: one year $7.50, three years $20, lifetime $100. All foreign subscriptions are $23.50 per year. For subscriptions from foreign countries, payment **only** by U S Postal Service money order or cashier's check drawn on a U.S. bank. All orders must be prepaid. Please allow 6 to 8 weeks delivery on new subscriptions and address changes. **POSTMASTER:** Send address changes to Circulation Manager, 1711 Mail Service Center, Raleigh, N.C. 27699-1711. Address all correspondence regarding subscriptions to Circulation Manager. If you have a problem with your subscription, dial (919) 662-4377. Articles in *Wildlife in North Carolina* may represent the personal views of authors, and do not imply endorsement by the North Carolina Wildlife Resources Commission. *Wildlife in North Carolina* is available on audio cassette as a courtesy of volunteer services of the Department of Cultural Resources, Library for the Blind and Physically Handicapped, Raleigh, N.C., (919) 733-4376. **The N.C. Wildlife Resources Commission is an equal opportunity agency.**

Why Birds Can Fly

written by David S. Lee ©2000
illustrated by David Williams

To fly, birds evolved a skeleton that is considerably different from that of other vertebrate animals. Because their major wing and leg muscles are packed tightly around the rib cage, and their sternum and rib cage are positioned far back and near the center of the bird, their center of gravity is in an optimal position in relation to the wings. A streamlined shape is important. Extra neck vertebrae allow birds to tuck in their necks while flying, and their legs bend at their ankles, enabling them to be tucked neatly against their body in flight.

But birds have made even more radical changes in the basic vertebrate skeleton. They have achieved a light and strong frame by eliminating unneeded skeletal parts and fusing many of the elements that are retained. Bone is generally heavy. For aquatic and terrestrial animals this is not a problem—additional muscle helps them to move a heavy skeleton. However, birds must adhere to strict size and weight limits to fly, so adding additional muscle is not an option. Instead the bones are lightened. The skeleton of a typical bird is only 5 percent of its total weight. The major parts of a bird's skeleton are hollow but reinforced with lightweight internal supports. The long bones are similar to the hollow girders and piping used for structural support in buildings and aircraft.

Birds have further reduced the weight of their skeleton by fusing and reducing various bones. For example, a bird's cranium is made up of a number of individual bones, but they are all fused together to house the brain, upper beak, nostrils and eye sockets. The forelimb has only three very reduced fingers. They work the outermost primary feathers which, like the flaps on an airplane's wing, are used for steering. The backbone and pelvic girdle are fused to provide a stronger support for moving parts of the skeleton.

A bird needs a dependable supply of oxygen for sustained flight and that necessitates other changes in the vertebrate skeleton. Up to a fifth of a bird's body is filled with air sacks connected to the lungs and this takes up a lot of space. To help with the packing, and to allow the lungs to expand, the hollow humerus in the bird's wing houses some of the air sacks. The rib cage is very flexible so that large volumes of air can be inhaled and exhaled as the bird flies.

Flight requires other interesting skeletal modifications:

- The sternum of most birds has a well-developed keel that serves as the site of attachment for the birds' large flight muscles. These muscles are the breast meat of a bird—white on chickens and other birds that seldom fly, and dark on birds that do. Why do some birds have white meat and some primarily dark? Numerous capillary veins are present in birds that are strong flyers; these are necessary to get oxygen-laden blood to the flight muscles.
- The wishbone, the best-known part of a bird's skeleton, is actually made up of two jointed collar bones. It helps to keep the wings in position when birds are in flight.
- The neck contains the only addition to a vertebrate skeleton. All mammals, including everything from moles to giraffes, have but seven neck vertebrae. Birds have from 13 to 25. The flexible neck compensates for the lack of jointed fingers on the foremost limbs and enables the birds to preen and move the head about, movements essential for seeing, courtship displays and catching or picking up food with their specialized bills.

The next time you bring home a bucket from the Colonel (or better still when dining out) take a look at some of the skeletal elements. Look for processes where muscles attach, think about the mechanical advantage, and examine all the fused bones in the chicken's back, or the tips of its wings. You can snap open a finger-lickin' good femur and amaze your dining companions with its hollow interior, or impress your mother-in-law with your knowledge of how all the little capillaries make the leg meat of a ground-dwelling bird dark.

Too bad chickens aren't fried whole—there are some great skeletal modifications in the heads and feet as well!

David S. Lee is the curator of birds at the North Carolina State Museum of Natural Sciences in Raleigh.

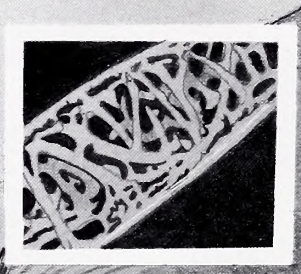
Other Reading

- Feduccia, Alan, *The Age of Birds* (Harvard University Press, 1980).

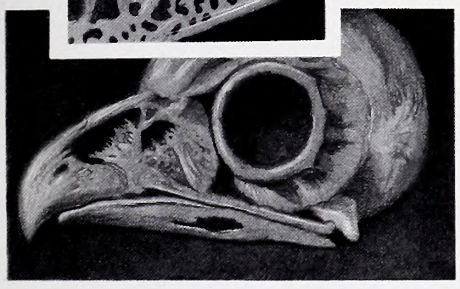
Surfing the Web

- For a good graphic of a bird skeleton and excellent discussions, see these sites: http://bioweb.uwlax.edu/zoolab/Table_of_Contents/Lab-09/Bird_skeleton1/bird_skeleton1.htm
- http://www.robinsonresearch.com/ANIMALS/BIRDS/anatomy.htm
- For a good discussion of what makes a bird a bird, including its internal structure, see this University of California site: http://wings.ucdavis.edu/Book/Animals/intermediate/birds-01.html

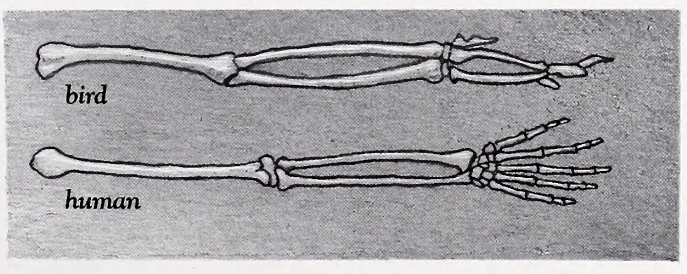
Birds have a basic vertebrate skeleton, *but their skeletons have developed adaptations that enable them to fly. Their bones are lighter and in many cases they are fused together for extra strength.*

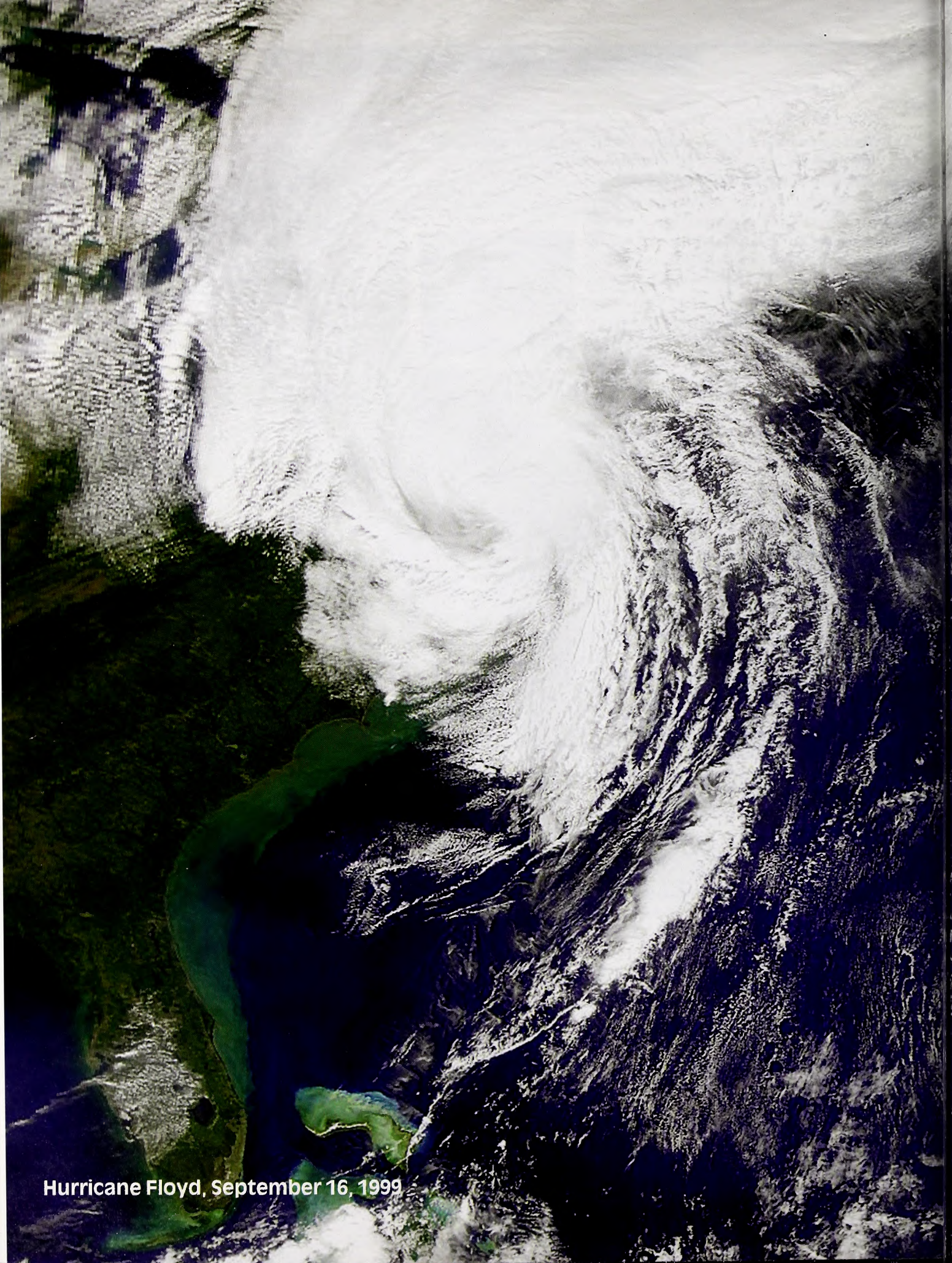


The wing bone of a bird is hollow *(right) with many internal supports. This makes it light and strong. The skull is made up of a number of fused bones (below). With more neck vertebrae than other vertebrates, birds can twist their heads about to preen and feed (below, right).*

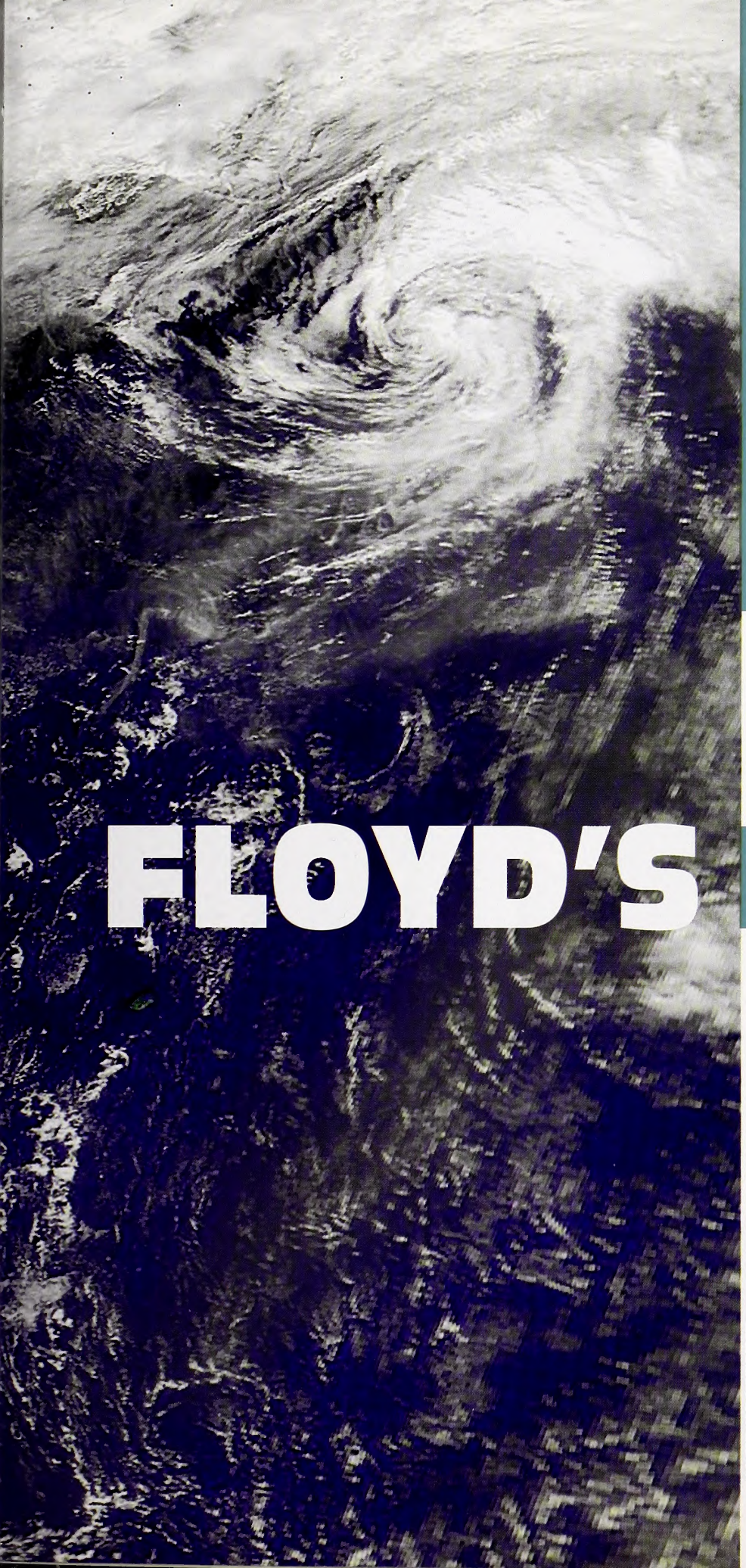


The arm bone of a human *and the wing bones of a bird are quite similar but different in function. Birds have fewer digits than humans. The wrist bones and the finger bones provide support for the large wing feathers.*





Hurricane Floyd, September 16, 1999



NASA/GODDARD SPACE FLIGHT CENTER

- 6,560 square miles under water
- 850 homes destroyed in Princeville
- 48 people killed
- $5 billion in damages
- 30 towns and cities flooded
- 30,000 homes damaged
- 30,000 hogs drowned
- 3 million poultry lost
- 880 cattle dead
- 650 roads closed
- 11 bridges destroyed
- 24 wastewater treatment plants swamped

Never before in state history has a single hurricane created so much human and environmental misery. That's why it's likely that we'll never forget...

FLOYD'S FURY

In the last days of August 1999, as Hurricane Dennis rambled through eastern North Carolina, who could have predicted that it would still be hanging around over a week later? And who could have foreseen that barely 10 days later, Hurricane Floyd would sweep through the same region bringing record rainfall and triggering the most devastating floods in state history?

Together, Hurricane Dennis and Hurricane Floyd produced as much rain in some areas as they normally get in six months. At one point, more than 6,000 square miles of eastern North Carolina lay under water.

What did the floods do to fish and wildlife populations, and what role has our relentless disturbance of natural ecosystems played in the flooding? We'll tackle these questions in this special issue of *Wildlife in North Carolina*, and we'll also report on the new technologies that can more safely dispose of hog waste. Finally we'll hear from the wildlife enforcement officers who put their lives on the line to bring others to safety. ⊠

The Long Wait

Six months after the worst flooding in North Carolina's history, scientists are watching and waiting to gauge the impact on the state's fish and wildlife.

written by Rodney Foushee

Hurricanes have undoubtedly ravaged eastern North Carolina for thousands of years, drastically shaping the landscape of the Coastal Plain and its wild inhabitants with winds and torrential rains. And the effects of these storms are not always negative. In fact, in many ways, nature is geared to harness its own catastrophic forces (see "Winds of Change," *Wildlife in North Carolina*, June 1997).

With Hurricane Dennis looming off the North Carolina coast in late August 1999, forecasters predicted localized problems for areas nearest the ocean's edge. Three weeks later, with the final exit of Hurricane Floyd, the impacts of the state's greatest natural disaster were felt more than 100 miles inland, as much of the eastern third of the state lay underwater. Sure, as with all hurricanes, strong winds buffeted the coast. Storm tides and erosion even cut two new inlets to the sea through barrier islands. But it was the torrential rains and ensuing floods that forever etched the storms of 1999 into the memories of millions of North Carolinians. Lives were lost; fortunes and dreams were buried beneath the rising floodwaters.

With up to 24 inches of rain dumped on wide reaches of eastern North Carolina, few areas were completely spared the flooding fury of the combined storms. Hardest hit were those areas in the upper Coastal Plain, as the swollen Neuse and Tar rivers left the confines of their banks for weeks, submerging the landscape and its inhabitants in the process.

In the wake of this deluge, biologists are assessing the impacts on the environment and its wild creatures. Many of the answers, they say, will come only with time.

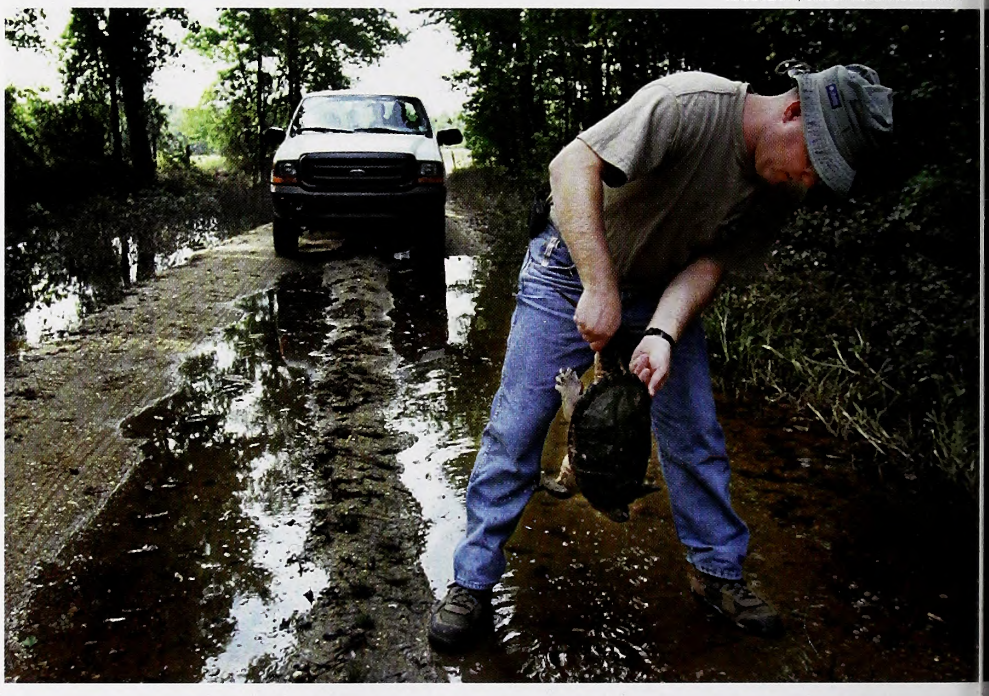
WILDLIFE. "There's no doubt that burying thousands of square miles of eastern North Carolina under water, for several weeks in some areas, has made an impact on fish and wildlife," explains David Cobb, wildlife management chief for the N.C. Wildlife Resources Commission. "The problem is, we don't have anything on record in North Carolina to measure this event against. This amount of flooding simply has never happened here before." At least not in the nearly 500 years since Europeans first set foot in the state.

Though direct evidence of the chaos that wildlife faced during the floods is scarce, there were glimpses of it. One wildlife enforcement officer spotted an intact covey of bobwhite quail huddled together on a log floating down the Tar River. Another wildlife officer rescued an exhausted cottontail rabbit he found clinging to a fence in a flooded area.

"The major direct impact, in terms of wildlife, would have been on the small animals," Cobb says. "The least mobile species of mammals and reptiles, such as rabbits, shrews, mice, box turtles and snakes would have taken it pretty hard."

Invertebrates such as worms and insects that form the base of the food chain also suffered a major loss. Millions of these creatures were likely killed outright by the floodwaters. "In a lot of the places that were inundated for several weeks, we found mats of dead

CHUCK LIDDY, RALEIGH NEWS AND OBSERVER



KEN TAYLOR

soil-dwelling invertebrates once the waters went down," Cobb says.

But larger, more mobile animals such as deer, bears and turkeys fared well through the flooding. "These species wouldn't have been impacted much directly," says Cobb. "Turkeys can live in trees for several weeks and then just fly out to higher ground. Deer and bears can swim out. Bears, especially, are good swimmers."

Medium-sized mammals, including foxes and raccoons, are also fairly adaptable. Many likely swam to the safety of higher ground.

What had more of an effect on wildlife than any direct loss of animals was the impact on the habitat, Cobb says. "We had an excellent acorn crop, but the winds from the storms blew many of the acorns out of the trees. In the areas that actually flooded, the mast was washed away downriver or spoiled and rotted under the water."

In some areas, bottomlands were scoured clean by the sheer speed of the rushing water. Much of the seed, winter food and cover that wildlife depends on was simply washed away. "Once the waters went back down, in many places we didn't find any wildlife, not even small birds," Cobb says. "That's most likely because there was no food left."

And with small-mammal populations scarce in some areas, predators, including hawks, owls and foxes, also likely had a difficult time finding food over the winter.

"The real measure of survival and recovery will come this spring," Cobb says. "We will have a much clearer picture of the impact on wildlife once everything greens back up."

There is plenty of hope for a speedy recovery. Wildlife populations were decimated after similar devastating floods struck the Mississippi River in the early 1990s. "Biologists there found that animals quickly recolonized within a few years after the floodwaters went down," Cobb says.

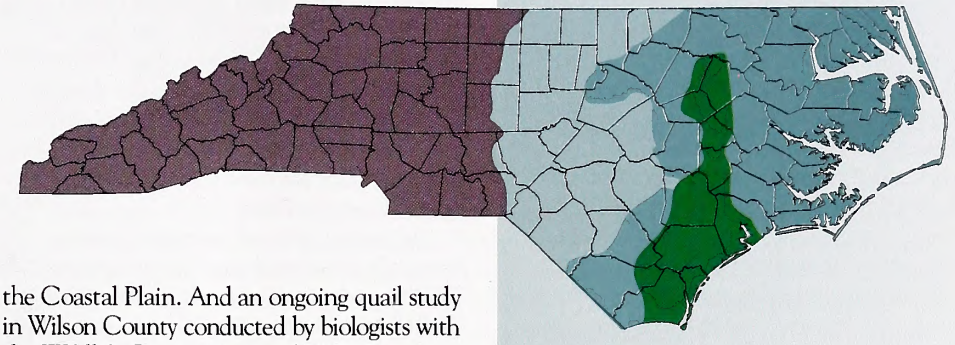
Preliminary reports for the past North Carolina hunting season show that both bear and deer hunting harvest numbers were down in the Coastal Plain. And an ongoing quail study in Wilson County conducted by biologists with the Wildlife Commission and N.C. State University showed that bobwhite numbers last fall after the floods were roughly half the numbers of the previous fall.

And as always with disasters, the flooding —or at least its timing—could have been worse for wildlife. "Had flooding of this level occurred in the spring or early summer, the results would have been devastating for the young of animals that nest on the ground, including wild turkeys, songbirds, quail and rabbits," Cobb says. "Fortunately, most of the young animals had left their nests before the floods arrived."

That was true even at ground zero along the Tar Heel coast, where 520 of a record high 1,155 sea turtle nests hatched prior to the arrival of Dennis. Despite the erosion of back-to-back hurricanes, 273 additional sea turtle nests survived the storm, although their hatch rates were likely reduced.

RECORD RAIN

Hurricanes Dennis and Floyd brought unprecedented amounts of rainfall to the eastern half of North Carolina, burying thousands of square miles of the state beneath the ensuing floodwaters. Below are the three-week rainfall totals between the two storms ending on Sept. 18, 1999.



Precipitation (Inches)

- 0-6
- 6-12
- 12-21
- 21-27

Source: National Oceanic and Atmospheric Administration

GRAPHIC BY LEE RATCLIFFE

Most large mammals including white-tailed deer (below) likely swam to the safety of higher ground during the floods of 1999. Less mobile, smaller creatures— such as rabbits, mice, turtles and snakes —had a tougher time during the flooding. James Sasser (left), director of the Howell Woods nature center in Johnston County, pulls an alligator snapping turtle out of a roadway that was flooded by Hurricane Floyd.

FISHERIES. Despite the inundation of nearly all the state's coastal rivers with tons of toxic chemicals and organic material, populations of freshwater fish fared surprisingly well during the floods of 1999. Unlike after Hurricane Fran in 1996, there were no major fish kills in North Carolina after the most recent floods. That's thanks in part, biologists say, to the sheer volume of water that moved through eastern North Carolina.

"It appears that even in the hardest hit areas of the Tar and Neuse rivers, fish populations were not drastically affected by the floods," explains Pete Kornegay, the Wildlife Commission's coastal fisheries research coordinator.

Biologists sampled the Neuse and Tar rivers after the floodwaters had receded and found a variety of fish species of various sizes and ages, including largemouth bass, crappie, sunfish, carp, gizzard shad, gar, bowfin and shiners.

"We were very surprised with the results," says Christian Waters, the Wildlife Commission's District 2 fisheries biologist. "We found both game and nongame species after the floods that mimic what we found in the rivers before the storms." In addition, nearly all of the fish collected appeared healthy, with few signs of disease. "We found both young and old fish," Waters says. "We found young fish that were born that spring that survived the floods."

"We theorize that the reason the fish made it through the floods so well was the sheer dilution factor," Kornegay says. "All the toxic compounds and organic debris were diluted and flushed away by the volume of water. We also had cooler temperatures after Hurricane Floyd, which helped to restore dissolved oxygen levels in the coastal rivers."

The Wildlife Commission plans some isolated stockings of freshwater fish this spring and summer to boost fish stocks in coastal rivers. There's little doubt that some less mobile aquatic animals, including rare freshwater mussels, were smothered by the tons of organic debris and sediment that were flushed into the rivers. The floods also likely depressed populations of other aquatic invertebrates, including insects that serve as food for fish.

FLOYD'S FURY

RECORD RUNOFF

The deluge produced by hurricanes Dennis and Floyd flushed vast amounts of sediment, organic matter and toxic chemicals into North Carolina's coastal sounds and estuaries. This color-enhanced satellite image taken Sept. 23 shows the magnitude of the event. **(1)** Sediments (bluish-green) are stirred up off the Outer Banks by Hurricane Floyd. **(2)** Topsoil (brown) heads down the Roanoke, Tar and Neuse rivers toward the sounds. **(3)** The Cape Fear River disgorges its dense sediment load (black) into the sea along the southern coast.

NASA/GODDARD SPACE FLIGHT CENTER

"There had to be an impact of the flooding on the total aquatic food chain," Kornegay says. "But we don't know the overall effect. Some fish species could benefit and others could be hurt. We really won't know the full impact for years to come."

That includes the impacts on North Carolina's prized striped bass population, recently declared recovered by federal and state fisheries managers. "We don't know the impact of this event on stripers. We think the Albemarle Sound population of striped bass moved to the east [of the sound] after the flooding." But the stripers had yet to return to western Albemarle Sound by December, where they normally stage for their spring spawning run up the Roanoke River.

"It's going to be an interesting spring, especially for striped bass," Kornegay says. "Will they return to their spawning grounds? We'll have to wait and see."

PAMLICO SOUND. North Carolina's rivers may well make a full recovery in the wake of Dennis and Floyd, but the prognosis for the state's estuaries doesn't look so promising.

Scientists are most concerned about Pamlico Sound—that vast, shallow inland sea between the North Carolina mainland and the Outer Banks. Combined with nearby Albemarle Sound, Pamlico Sound makes up the nation's second-largest estuary and serves as a vital nursery area for dozens of important marine fish species. With little tidal influence and few openings to the ocean, the poorly flushed sound has become the final repository for much of the sediment, organic matter and toxic chemicals that washed out of eastern North Carolina during the floods.

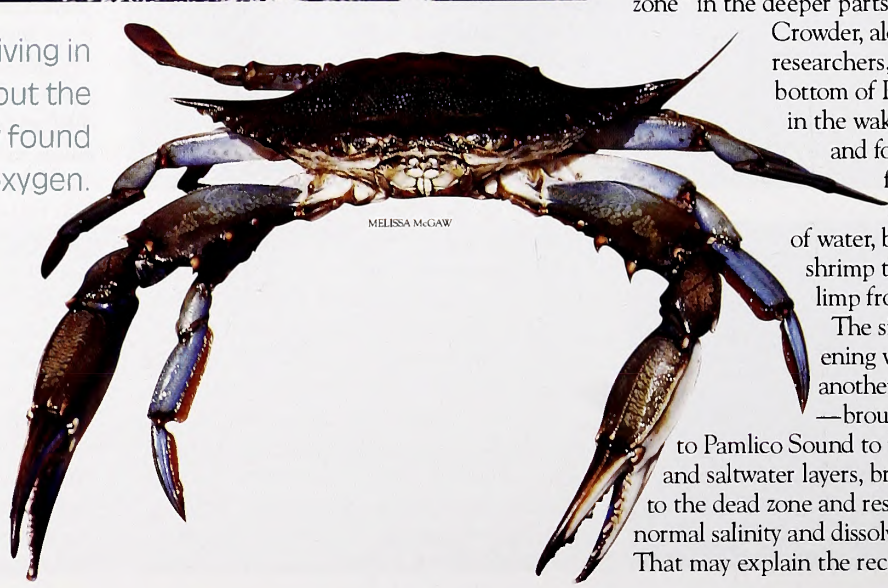
Initially, the billions of gallons of fresh water that were pumped into Pamlico Sound by the floods posed a direct threat to its rich diversity of marine life. "Hurricane Floyd pushed a tremendous amount of fresh water into Pamlico Sound," explains Larry Crowder, a marine ecologist at the Duke University Marine Laboratory in Beaufort. "Every place where Pamlico Sound was shallower than 18 feet [most of the sound], the flooding pushed out all of the seawater. In the deeper parts of the sound, a dense layer of salty water was trapped at the bottom, with virtually no oxygen for fish and other organisms."

Though most large fish exited Pamlico Sound with the arrival of Dennis, the huge influx of fresh water over several weeks stressed many immobile bottom-dwelling invertebrates, including oysters, clams and sea worms, which form the bottom of the food chain. In some areas of the lower Neuse River and western Pamlico Sound, invertebrates adapted for more salty conditions were flat-out killed. Meanwhile, young fish, crabs and shrimp—unable to escape—were trapped in the dense, salty, oxygen-starved "dead zone" in the deeper parts of the sound.

Crowder, along with other researchers, sampled the bottom of Pamlico Sound in the wake of the floods and found that young fish were surviving in the dense layer of water, but the crabs and shrimp they found were limp from lack of oxygen.

The situation was worsening when, ironically, another hurricane—Irene—brought enough wind to Pamlico Sound to remix the fresh- and saltwater layers, bringing new life to the dead zone and restoring the sound's normal salinity and dissolved oxygen levels. That may explain the record white shrimp

...young fish were surviving in the dense layer of water, but the crabs and shrimp they found were limp from lack of oxygen.



MELISSA McGAW

harvest along the coast last fall.

It's the nutrients—primarily nitrogen and phosphorus—washed into the sound from millions of gallons of animal waste, flooded wastewater-treatment plants and billions of rotting leaves that pose the greatest threat to Pamlico Sound.

"We have certainly had problems with nutrients in the coastal rivers for 20 years," Crowder says. "Now the problems have been exported downriver to the Pamlico Sound. What we got last fall was a megadose of what we have been getting in small doses for years."

Some nutrients are necessary to sustain life in the estuary, but too much fertilizer can cause algae blooms, which in turn suck the oxygen out of the water as the tiny plants die off and are rapidly decomposed by bacteria. With no oxygen in the water, massive fish kills are inevitable.

Crowder has already noticed problems in Pamlico Sound. "We have detected many fish with open, bleeding sores that show stress from low oxygen," he says. "Many have swollen abdomens, indicating a bacterial infection."

And the worst may be yet to come.

Monitoring with surface, air and satellite sensors, scientists have determined that there is now 10 times the normal amount of algae growth in Pamlico Sound as a result of the flooding. But cooler winter water temperatures and murky, sediment-laden water have kept the algae in check so far, explains Pat Tester, an oceanographer with the National Oceanic and Atmospheric Administration based in Beaufort. The algae are light-limited at this point, Tester says, and the tiny plants can't multiply further without more light. That may not be the case this summer as water temperatures rise and the water clears, allowing light to penetrate the depths of the sound.

And with the Pamlico's poorly flushed system—by some estimates, it takes up to a year for runoff to move through the sound and out to sea—the nutrient problem is not going away anytime soon. Instead, a rich layer of fertilizer is waiting to be activated in the bottom muds of Pamlico Sound.

"My guess is that we will see low-oxygen problems on Pamlico Sound this summer as the water warms back up," Crowder says. "But it all depends on the weather." A wet spring or summer with little wind could likely spell disaster as the sound again stratifies into layers, with algae blooms consuming the little remaining oxygen on the surface. On the other hand, a dry year with plenty of wind will avert fish kills by keeping the waters mixed up and oxygenated as the organic material decomposes.

"There is the potential for mega-problems on Pamlico Sound," Crowder says. "We will have to wait and see."

It'll be a long wait, indeed. ⊠

the flood NEXT TIME

We can't blame Hurricane Floyd's destruction entirely on our alterations of the landscape, but it would be folly to dismiss their long-term effects.

written by Lawrence S. Earley

In the wake of the worst human and environmental disaster in state history, it's tempting to dismiss the flooding from hurricanes Dennis and Floyd as the result of an "unnatural" event. Together, the two hurricanes produced as much rain in some areas as these places normally get in half a year. Rocky Mount received more than 7 inches of rain from Dennis and another 16-plus inches 10 days later from Floyd. The total of 23 inches from the two storms amounted to nearly half the region's annual rainfall, and it arrived in less than two weeks.

"I think the point that has to be made is that [Dennis and Floyd were] unusual rain events," says Jim Gregory, a hydrologist in the Department of Forestry at North Carolina State University. "The storage capacity of the soil was already so full after Hurricane Dennis came through that the additional water from Floyd just ran off."

Yet it is likely that the increased flooding we've seen over the last three years is the price we are paying—and will continue to pay—for our relentless alteration of the natural Piedmont and Coastal Plain landscapes. Indeed, the real lesson from September's floods may be that an increasingly urbanized landscape, minus the natural features that moderate and hold back floodwaters, has left

Two days after Hurricane Floyd struck the region, a street sign in Greenville shows the depth of the flooding. The Tar River spilled its banks and inundated parts of the city, flooding entire neighborhoods and even dormitories at East Carolina University.

LAWRENCE S. EARLEY

the region vulnerable to increased flooding.

"To say this is an event that we won't see for another 500 years is folly," cautions Andy Wood, environmental educator at the N.C. Aquarium at Fort Fisher. "We could see it again next year. We almost saw it three weeks after Floyd, when Hurricane Irene threatened the coast."

NATURAL LANDSCAPES AND FLOODS

Floods happen whether people are living in the watershed or not, although they are worsened by human practices in the watershed. In the natural world, flooding is a river's way of dealing with excess water, and it's as natural and even beneficial as the rain that triggers it. Over eons, floodwaters have transported the eroded materials of our ancient mountains to form the Coastal Plain and the Piedmont. Even today, floods continue to deposit sediments across floodplains and they are responsible for the rich soils of many of our riverine ecosystems.

Yet a river basin that may drain thousands of square miles is blessed with many natural features that combine to store excess rain water or slow its movement.

Soil and roots. Rainfall can move in three different directions once it's on the ground. About half is absorbed by the soil, into the shallow layers of the water table or deeper into the aquifers. Another 40 percent either evaporates or is taken up by plant roots and transpired as a vapor through the foliage. Only a small amount—about 10 percent— actually manages to flow off the land and enter a stream as runoff.

"The more roughness in floodplains, the more water is going to be detained before going downstream," says Gregory. "You basically spread the flooding out. On the tributary streams you've got a little higher flooding and longer-term flooding, but that will hold the water back and cause the downstream flood crest to be slightly smaller."

Stream channels and floodplains. Even when water runs overland into a stream, the stream channel can store great amounts of water until it's filled. At that point it overtops its channels and floods across the floodplain which accommodates the excess, at least temporarily. Floodplain vegetation can absorb some water in its root systems or physically slow it down. Floodplains play an essential role in reducing high water levels downstream.

Wetlands. Wetlands also perform critical roles in storing water. In stream headwaters, wetlands help reduce the volume of water entering tributaries and limit the size of the flood peak on the river's main branch. Bottomland swamps flank many southern Coastal Plain rivers and streams, while farther downstream, especially along the Neuse, Tar and Pamlico rivers, lie vast pocosin wetlands. These inhospitable areas absorb rainwater like giant sponges and release it into the sounds slowly, helping to preserve estuary salinity levels that are critical for fish and shellfish. A wetland's ability to store floodwaters depends a lot on topography and other factors—the gentler the slope of the wetland, the better the storage.

Stream meanders. Even the sinuous shapes of streams as they run to the sea serve to slow the velocity of water, absorbing the energy of onrushing floodwaters and decreasing their effects.

ALTERED LANDSCAPES AND FLOODS

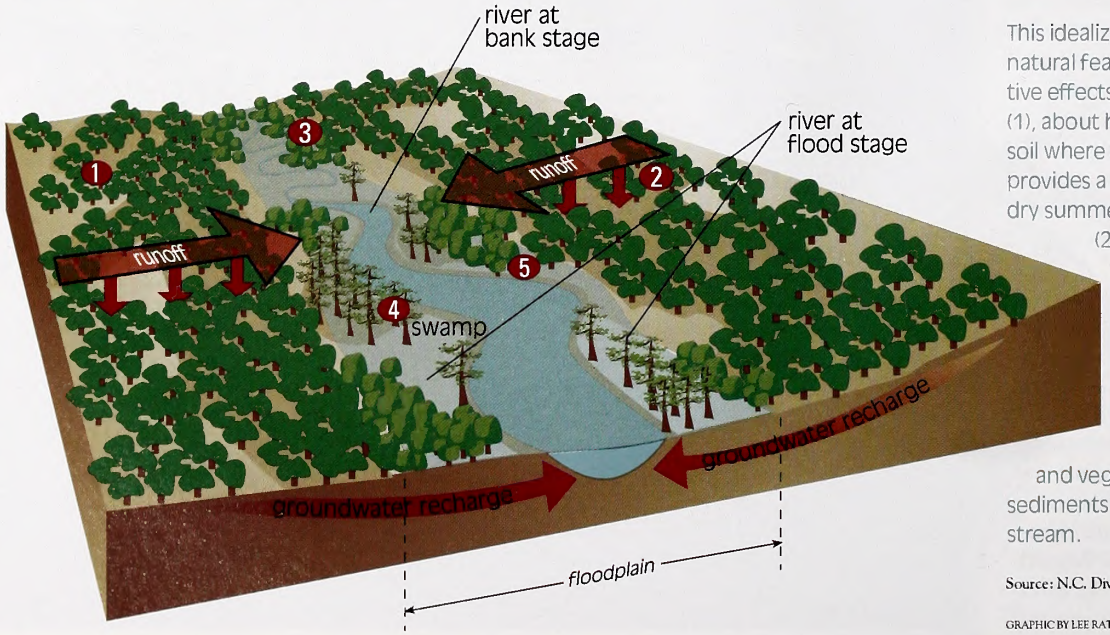
In the areas where the most disastrous flooding occurred, however, many of these natural features have been either eliminated or severely modified over the years, interfering with the flood storage functions of the landscape.

Wetland drainage: Ever since European settlement began, humans have drained and filled wetlands for a variety of purposes—to reclaim land for crops, to create the drier land needed for pine plantations or to build human communities. Nearly 95 percent of the state's original 7.8 million acres of wetlands occurs in the Coastal Plain, and that's where most of the wetland conversions have occurred. By 1991, according to the state's Department of Environment and Natural Resources, half of North Carolina's wetlands had either been filled or drained so that they no longer performed their functions, or they had been altered so that they only partly worked as they should.

Minus functioning wetlands, river drainages are missing one of their chief defenses against harmful flooding.

Agricultural and forestry activities. Compared to a parking lot, cropland absorbs lots of water, yet even farmland moves water quite efficiently to drainages. In this century alone, thousands of miles of field ditches have been dug on farms and tree plantations to channel water off fields, where it might pre-

A NATURAL LANDSCAPE



This idealized landscape shows some of the natural features that help reduce the destructive effects of floods. In a forested landscape (1), about half the rainfall percolates into the soil where it recharges groundwater levels and provides a source of water for streams during dry summer months. Trees and others plants (2) absorb another large percentage leaving only a small amount of water to enter the stream as runoff. Additionally, a stream's meander (3) slows water in the flood stage; swamps and other wetlands (4) reduce the amount of runoff entering the stream; and vegetated floodplains (5) hold back sediments that otherwise would enter the stream.

Source: N.C. Division of Water Quality

GRAPHIC BY LEE RATCLIFFE

CHRIS SEWARD, RALEIGH NEWS AND OBSERVER

Wetlands help to store floodwaters, but over the years, ditches like these have drained thousands of wetland acres and deprived watersheds of key flood-storage capabilities. Ditches such as this one at left in Brunswick County were dug illegally to drain thousands of acres of wetlands last year.

vent crops from growing. These ditches shoot water quickly to tributaries.

In addition to installing drainage ditches, farmers as well as foresters clear trees and other naturally growing vegetation so that they don't compete with crops. As a result, much of the ability of the land to store water or slow it down is removed. Erosion may strip the most absorbent layers of topsoil, leaving the more impenetrable clay layers behind, particularly in the Piedmont. As farms have grown larger and forested buffers have shrunk, runoff from saturated fields has become a serious problem.

Channelization. Related to the effects of wetland conversion and agricultural drainage are the effects caused by stream channelization. Channelizing means using heavy machinery to straighten, widen or deepen a stream. In urban areas, streams are almost always straightened and encased in concrete.

"What channelization does is destroy the floodplain," says geologist Stan Riggs of East Carolina University. In the 1970s, Riggs was involved in a landmark court case involving Chicod Creek in Pitt County that effectively ended channelization as it was then practiced. "When we got involved in the case on Chicod Creek, they were dumping the debris from digging the 'ditch' on both sides of the stream. It did two things: it made the 'pipe' higher and it closed off both sides of the floodplain from the channelized stream."

Both the Soil Conservation Service (now called the Natural Resources Conservation Service) and the U.S. Army Corps of Engineers channelized streams in eastern North Carolina, the former for crop protection and the latter for flood control.

No one knows how many miles of streams were so affected, although Riggs says, "There are not many creeks in eastern North Carolina that haven't been ditched."

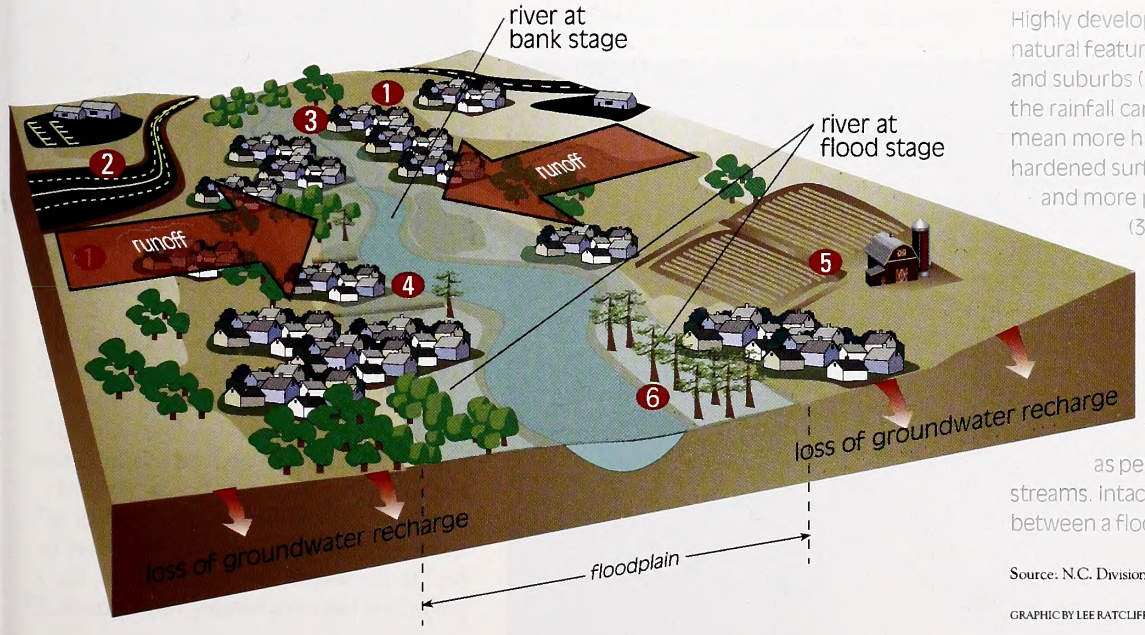
The irony is that though in many cases channelization was aimed at alleviating flooding, it may well have worsened flooding. "The more channelized a stream is, the more rapidly the water gets downstream. And the higher the flood crest," says Gregory.

Floodplain development. With some of the flattest and most fertile land available, floodplains have long been magnets for people wishing to build houses as well as grow crops. But construction activities in the watershed, and especially in floodplains, have had major effects on flooding.

"Buildings and bridges in the floodplain occupy space," explains Jerad Bales, with the U.S. Geological Survey. "It's like getting into the bathtub: the amount of water doesn't change, but because there's something else in there taking up space, the water level rises." As a result of this kind of development, a house built outside the 100-year floodplain 30 years ago might find itself in the middle of the floodplain today.

But development anywhere in the watershed, not just in the floodplain, interferes somewhat with the natural ability of the land

AN ALTERED LANDSCAPE



Highly developed landscapes lose many of the natural features that prevent flooding. As cities and suburbs (1) replace forests, more than half the rainfall can end up as runoff. More people mean more highways, parking lots and other hardened surfaces (2), creating more runoff and more pollution. Channelized streams (3) force water more quickly downstream and contribute to destructive flood crests. To make way for developments encroaching into the floodplain, wetlands (4) are drained. Ditches (5) dug to drain cropland move excess water, as well as pesticides and fertilizers, directly to streams. Intact wetlands (6) can provide a buffer between a flooding river and a community.

Source: N.C. Division of Water Quality

GRAPHIC BY LEE RATCLIFFE

to store water. Houses, driveways, shopping malls and streets create hardened surfaces that channel even more runoff directly to streams. The same amount of rainfall can create unequal amounts of runoff in rural and urban areas.

"Water runs off more quickly in a developed area," says Bales. "When a couple of streams come together, they may combine in a way that makes flooding worse than before, when the water ran off more slowly."

The increased runoff often changes the physical structure of the stream. To handle the increased water, a stream channel widens and deepens, increasing the river's velocity. "Increased flows cause streams to cut down so that in many cases they can't get out of their banks," says Ron Ferrell, program manager with the Wetland Restoration Section of the state's Division of Water Quality. "Water that used to spread out naturally is now confined in these deep channels until it can get to an area where it can flood out." That area is downstream, where most of the serious flooding took place in 1999.

Increased urbanization not only reduces the landscape's ability to absorb water but also increases pollution. The same processes that contribute to destructive flood crests also sweep fertilizer and pesticide off fields as well as a variety of industrial pollutants off city and suburban streets, parking lots and driveways. The result is consistently lower ratings for the water quality in streams.

Highway construction. The proliferation of highways in a watershed also contributes to flooding, in two ways: by increasing runoff, and in some cases by actually damming rivers. For example, a low bridge on a river can cause debris to accumulate on the upstream side, backing rising water up behind it. "The volume of water coming down the river is still basically the same, but the river is backed up and causing more flooding," says Bales. In some areas, roadways can act as dams, especially if a culvert that allows water to flow under the roadway is undersized. Again flooding takes place as a result.

ALTERED LANDSCAPES AND HURRICANE FLOYD

The more water you can hold back from a stream for a longer period, the smaller the size of the flood crest on the main stem of a river and the less the threat posed to downstream areas. Stream channelization, floodplain development, urbanization and wetland conversions are pushing greater volumes of water downstream faster than ever before. Fifty years ago, it may have taken two days for water to get from the headwaters to the main river channel; today water may take only a few hours to travel the same distance.

That's why many experts believe that land-use changes in the Piedmont and Coastal Plain landscape may have played an important role in the destruction caused by Hurricane Floyd.

Stan Riggs was among several geologists from East Carolina University who in the days after Floyd, blamed widespread alterations in watersheds for the immensity of the damage. "Under any conditions, we would have had a flood," he says today. "But my own opinion is that all of our modifications of natural drainage patterns allow us to move a little farther into the floodplain. Thus every little storm has more of a response, not because the flood is any worse, but because there are more people in the floodplain, more development, more farming, more industry. As we've drained the lowlands, we've encroached, and it's the encroachment that has cost us dearly. We can't continue to pave paradise and not have problems."

Jerad Bales adds that by concentrating on the cumulative impacts of development on a storm of the magnitude of Floyd, we may be missing a more ominous message.

"Development does affect flooding," he says, "but I'm not sure that it worsened the effects of a storm like Floyd. Development affects the smaller rainstorms—the two-year, or five-year, or 10-year floods—more than it affects the 100-year or 500-year events."

What's chilling about this analysis is that it suggests that the loss of natural features such as functioning wetlands, floodplains and stream meanders will intensify the flooding from storms that occur much more frequently than a storm like Floyd. It may be that what used to be a 10-year flood may now occur every five years, mostly because of what we've done in the floodplains and in the watersheds. And this is especially true if we continue to rebuild in flood zones, as we've done in the past. Nationwide, 40 percent of National Flood Insurance payments have gone to structures with repetitive losses.

What also bodes ill for the future are the development trends in the watersheds of many of our eastern rivers, especially the Tar-Pamlico and the Neuse, which flooded severely during the hurricanes. In the Tar River basin from 1982 to 1992, the amount of land in cultivated cropland and forestland decreased, while the urban and built-up land increased by 25 percent. In the Neuse River basin, urban and developed lands increased by 75.6 percent from 1982 to 1992. From 1970 to 2020, the population may well grow by 100 percent, bringing in its wake even more development. The cumulative effects of these changes on the landscape suggest greater rather than less flooding in the future.

As this photo shows, roads through floodplains often act like dams, raising local flood levels. Depicted is U.S. Highway 64 Bypass east of Princeville, near the Tar River, as it intersects with Secondary Road 1523.

JERRY RYAN, USGS

THE FLOOD NEXT TIME

Flooding in our increasingly urbanized landscape is sure to occur again and again. Hopefully it won't match Floyd's flooding, although meteorologists are already predicting a hurricane year for 2000 of equal or greater intensity than last year's.

Ralph Heath of the U.S.G.S. made this very point more than 20 years ago, when he analyzed the effects of the rapid pace of development in North Carolina's Coastal Plain. "We have built and are building below the level reached by past floods, none of which are as large as those that will occur," he wrote. ". . . The worst [floods] are yet to be." In the wake of Hurricane Floyd, his prediction has a frightening ring of truth. ⊠

a cleaner hog industry?

MELISSA McGAW

In the wake of record flooding in eastern North Carolina, citizens are demanding cleaner technologies for industrial hog farms. What are the possibilities?

written by Chris Powell

The floods of 1999 may have marked a pivotal point for North Carolina's hog industry, which has defined our state's environmental consciousness in recent years. For the past decade, the industry has been under fire, largely from a vocal minority that has decried the smell and pollution from swine facilities. But last September, the charged issue reached a new level as the entire state and even the nation was fed a steady stream of jarring images: hogs drowned or stranded on tin-roofed islands; incinerators burning piles of carcasses; lagoons oozing brown waste into the surrounding waters.

Though flooded livestock operations weren't the only contaminants, one could hardly miss the meteorological message sent to the eastern third of our state, plagued by years of rupturing hog lagoons and fish kills. It was as if Mother Nature, far past her boiling point, had lashed out with the double-barreled furies of hurricanes Dennis and Floyd. Overnight, some hog farms were washed away, and there was a sense that the political winds had shifted against the state's second-largest industry.

Among the first effects was a new rule that intensive livestock facilities with more than 50-percent damage could not be rebuilt in the 100-year floodplain. When the floodwaters had risen, about 30 lagoons were submerged, resulting in tens of thousands of gallons of hog waste entering our estuary system. The emergency ruling meant that about 100 swine facilities would no longer operate near a river, stream or wetland. In addition, the state's Clean Water Management Trust Fund allocated $5.7 million to buy conservation easements that would pay owners of less damaged operations to relocate out of floodplains.

But possibly even more significant was the clamor raised by environmentalists who believed repairable hog facilities should be rebuilt with alternative waste-treatment methods. In the mid-1980s, when intensive livestock facilities gained a foothold, environmental rules couldn't keep pace with the exploding industry and its strong political lobby. As a result, storing and treating the waste in lagoons before spraying it onto fields became a standard disposal method. The lagoon system works by creating an environment where bacteria can break down the waste solids and their nutrients. The weaker liquid is then sprayed onto grass fields, which absorb the nitrogen (a nutrient).

Julian Barham (below), owner of Barham Farms Inc. in Clayton, stands on top of a cover that completely encloses his hog lagoon. In addition to trapping the greenhouse gases produced by the lagoon, the cover significantly enhances the breakdown of the wastewater.

MELISSA McGAW

However, runoff from these fields has been shown to cause nutrient loading in our rivers. Also, these open lagoons emit ammonia into the air, which has been proven to fall as nitrogen-enriched precipitation. Environmentalists saw the flood-damaged livestock facilities as a chance to turn back the clock and begin anew with better waste-treatment technology at existing facilities. (In July 1999 the General Assembly extended a moratorium until 2001 that requires new hog facilities to be constructed with alternative treatment systems.)

Ultimately, legal and economic hurdles prevented an immediate overhaul of the state's 2,000-plus pork producers. Still, there were signs that the outcries hadn't fallen on deaf ears. Gov. Jim Hunt had suggested a 10-year phaseout of lagoon systems prior to the flooding. But after Hurricane Floyd, some top officials requested that the period be reduced to five years. Also, Smithfield Foods pledged to spend $15 million to research alternative waste-treatment methods. The announcement from the Virginia corporation, which had purchased control of the majority of North Carolina's pork producers just months before the floods, was a clear acknowledgment of the public's growing intolerance. Indeed, the aftershocks reverberating from the floods would seem to suggest that the days of storing and treating liquid livestock waste in a lagoon are numbered. But are they really?

"I couldn't keep this property if I didn't raise pigs. I couldn't pay the property taxes. There's just nothing farmers can raise any more that will pay what pigs will."

—Julian Barham
owner of Barham Farms, Inc.

A leader in attempting to answer that question is North Carolina State University's (NCSU) Department of Biological and Agricultural Engineering. The task for this group of researchers is not simply to determine how better to treat the wastewater. The technology already exists to filter lagoon effluent back to drinking-water standards, but it's expensive. Instead, the challenge is to develop new technology that is easy to operate, can be retrofitted to existing systems and—above all—is affordable.

Most intensive swine operators work under contract for larger companies, solely bearing the cost of maintenance and upkeep of their facilities. Many, like Julian Barham, the owner of Barham Farms Inc. in Clayton, bought into the hog industry to hold onto farms facing shrinking tobacco quotas and overall low crop prices.

"I couldn't keep this property if I didn't raise pigs," says Barham, who operates a 4,000-sow nursery farm. "I couldn't pay the property taxes. There's just nothing farmers can raise any more that will pay what pigs will."

At present, NCSU researchers are working with Barham, who—because of a nearby housing boom—took it upon himself to install a higher level of waste treatment technology. "We are getting a lot of people moving out this way, and we are hoping to keep from running into problems," Barham said.

Barham's farm, in many respects, is no different from other intensive livestock facilities. He has hog houses, a storage lagoon and spray fields. But that's where the similarities end. Barham has topped his lagoon with a high-density polyethylene cover that traps methane gas produced from the breakdown of the waste. Using PVC pipes, the methane (a combustible fuel source) powers a generator and a boiler that provide 75 percent of the electricity and all of the hot water needed to run his farm. Also, because the lagoon is covered, the greenhouse gases (such as methane or nitrous oxide) do not escape into the atmosphere. Moreover, the cover significantly accelerates the bacterial breakdown of the waste into a weak effluent, which is held in a separate retention pond. The water from the pond is applied to nearby fields.

Mark Rice, an extension specialist with the NCSU Department of Biological and Agricultural Engineering, said the amount of nitrogen in the retention pond water can be as low as a 10th of what is pumped directly from uncovered lagoons. "In the summer, we drop down to about .6 pound of nitrogen per 1,000 gallons, as opposed to 5 or 6 pounds of nitrogen per thousand gallons," he said.

Still, Barham has the typical problem of wastewater disposal. Pigs drink water which, of course, becomes urine. In addition, hog facilities are cleaned by periodic flushings that drain into a lagoon. The effluent must then be applied to land, a practice that is often limited by wet weather or lack of available space. To circumvent this, Barham is building greenhouses, where he hopes to grow an average of 7,000 pounds of tomatoes per week.

In addition to providing extra income, each tomato plant consumes one gallon of water per day. Barham hopes he will be able to pump constantly from his retention pond to his greenhouses. Also, his methane-burning generator produces an exhaust of mostly carbon dioxide, which he plans to route to the greenhouses to enhance plant growth. "We are hoping that when we get through with this, the only waste we are generating from this farm will be oxygen and tomatoes," Barham jokes.

It is a remarkably efficient system that Barham says practically runs itself. But like all good ideas, it does have a catch—start-up expenses. At 50 cents a square foot, his lagoon cover costs about $150,000. Plus, tack on another $125,000 or so for a generator and even more for the piping, pumps and other infrastructure. He believes his farm will be able to recoup his investments within seven years, but he also stresses that his techniques are not for everyone.

"This system that we have is not going to solve the hog industry's problems by any means," Barham says. "And I am certainly not recommending that everybody put a cover on. The cover will help with rainwater problems and lagoon odor, but that's not to say that every lagoon needs a cover, either."

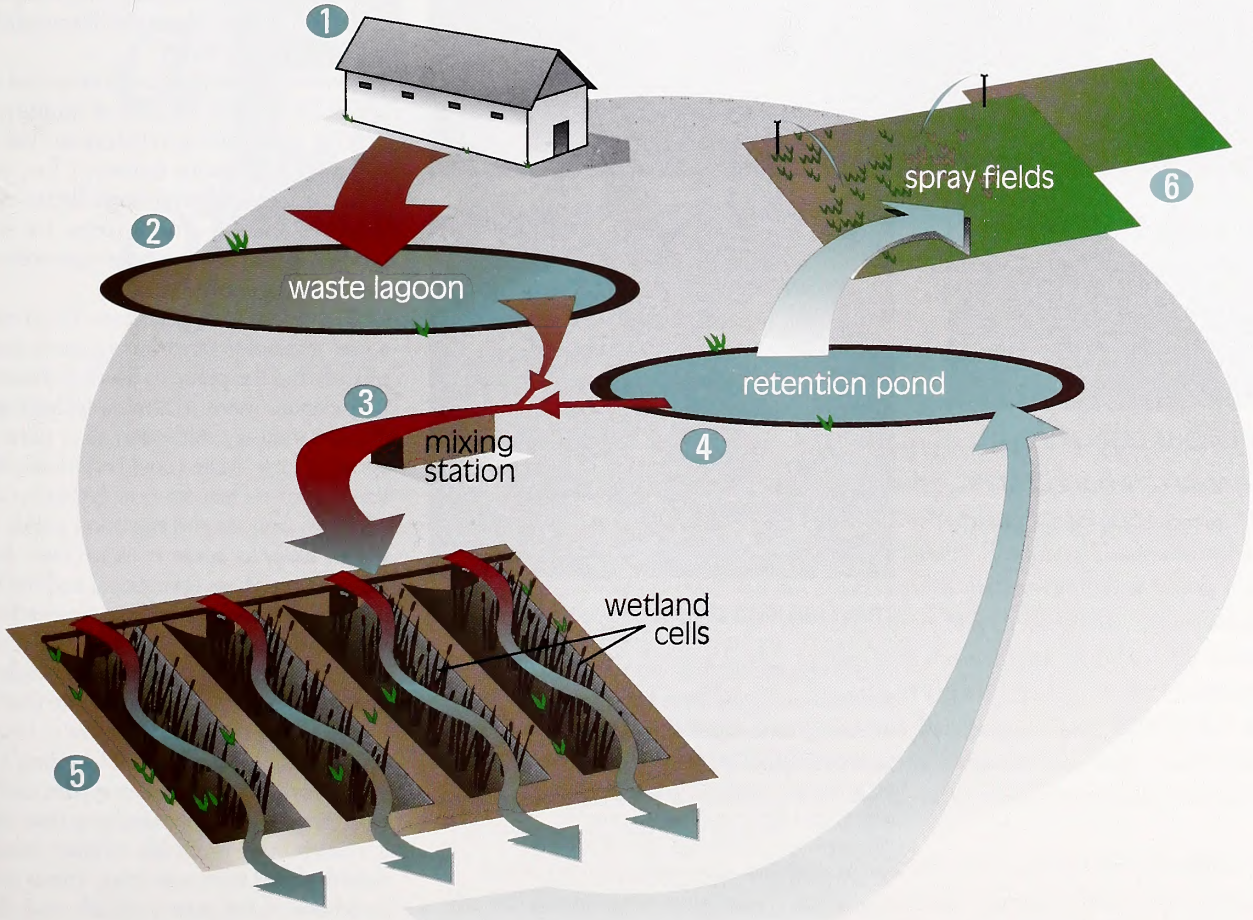
Another alternative waste-treatment system is being developed by NCSU researchers, working in cooperation with the U.S. Department of Agriculture and the Natural Resources Conservation Service, at the Gerald Knowles Farm, in Duplin County. This Constructed Wetland Treatment system filters water from an uncovered lagoon that services a 2,600-head swine nursery facility. The system works by pumping wastewater from a lagoon to a small holding tank, where it is diluted with water from a retention pond similar to Barham's. The nitrogen-reduced water is then slowly fed through a system of manmade wetland cells that resemble trenches planted with swampy vegetation such as cattails and bulrushes. Rice and fellow researchers tried using agronomic plants such as soybeans and rice, but their crop cycles were too short. Wetland vegetation, on the other hand, was found to break down waste water year-round.

The wetland plants don't consume the nitrogen like grass, which must be harvested. Instead, wetland vegetation is naturally accompanied by microbes that convert the nitrogen from an ammonia state to nitrogen gas (found naturally in the atmosphere).

Nutrients can be digested either in anaerobic (without oxygen) or aerobic (with oxygen) conditions. For example, a lagoon is typically anaerobic (unless aerated), providing one type of nutrient digestion. The beauty of

CONSTRUCTED WETLAND TREATMENT SYSTEM

Waste generated from a hog house **(1)** is first treated in a lagoon **(2)** then pumped to a mixing station **(3)** where the wastewater is diluted with weaker effluent piped from a retention pond **(4)**. The diluted liquid is then allowed to trickle through a series of man-made trenches planted with wetland vegetation **(5)** that neutralize most of the liquid's nutrients. The effluent is then collected at the end of the trenches and pumped to the retention pond **(4)** where it is sprayed onto nearby grass fields **(6)**. The remaining nutrients are consumed by the grass, which is later harvested and removed from the farm.



GRAPHIC BY LEE RATCLIFFE

the wetland system is that it uses both types of microbial conversions. "The wetland plants are adapted to where they actually pump oxygen down into their root systems," Rice said, "and that provides an aerobic environment. And then you have anaerobic conditions in the water column around that."

By the time the wastewater reaches the end of the wetland cell, the amount of nitrogen has been greatly reduced. The water is then pumped back to the retaining pond, where it can be applied gradually to spray fields. Rice says the wetland system reduces the nutrient content of the water to about 30 milligrams of nitrogen per liter. (In comparison, 10 milligrams per liter is the nitrate standard for drinking water.)

Though the wetland system is the least expensive of the technologies being studied, the installation cost would still likely climb into the six figures for growers. A current operation, in addition to its preexisting lagoon, would need a retention pond dug, as well as two or more wetland cells. Also, pumps and piping would be needed. However, the upside is that because the wetland cells significantly filter the wastewater, less land is needed for a spray field. Also, the system can be applied to existing operations, and maintenance of the wetland cells is minimal.

MELISSA McGAW

Yet another waste-management system being looked into is the Aerobic Upflow Fixed-Media Biofiltration/Solids Separation system, which was designed by the company EKOKAN, based in Cary. This approach is unique in that the solids are first separated from the liquid, then made into fertilizer pellets that could be sold. Instead of using a lagoon, the liquid is pumped directly into two biofilters, stacks of connected, metal containers. Oxygen is then injected into the system, producing an upflow of bubbles that push the wastewater through rolls of a plastic screen that provide a surface area for a film of bacteria. The bacteria stabilize the organic matter, and almost all of the ammonia is removed, as well as 80 percent of the nitrogen. The system also reclaims much more of the phosphorus found in waste than do present lagoon systems. This could make biofiltration a leading treatment alternative if land-application standards become phosphorus-based instead of nitrogen-based.

"My company is going to offer a lease-type situation, which will allow pork producers to avoid the initial investment because many of these people have the debt from the previous operations," said Alexandra Kantardjieff, president of EKOKAN.

Even so, the system is still projected to add about $3 to $4 to the cost of raising a pig. (Recent years have seen historically low profit margins for the swine industry.) Too, the biofilters require a relatively high degree of maintenance. And like other systems, the treated effluent would have to be temporarily stored before being applied to land.

The floods from Hurricane Floyd instilled a new sense of urgency among environmental officials and the public to develop environmentally cleaner waste treatment technologies for the hog industry. Although all or none of the systems being studied could eventually be utilized, what is clear for now is that an alternative to lagoons and retention ponds will not be likely for some years to come. It takes water to run these operations, and the liquids must be dealt with somehow. Researchers are hopeful that one day they will have a menu of waste-treatment options from which pork producers can choose. But before that can happen, these systems will have to become economical. Most of North Carolina's pork producers are simply farmers—men and women trying to hold onto land at a time when it's much more profitable to plant housing developments than row crops. Farms are the backbone of this state's wildlife, and that's something we can't allow to be washed away. ⊠

"My company is going to offer a lease-type situation, which will allow pork producers to avoid the initial investment because many of these people have the debt from the previous operations."
—Alexandra Kantardjieff, president of EKOKAN

MELISSA McGAW

These fertilizer pellets are created during the waste-treatment process of the Aerobic Upflow Fixed-Media Biofiltration/Solids Separation system. Alexandra Kantardjieff (above left) president of EKOKAN, and Philip Westerman, with the N.C. State University's Biological and Agricultural Engineering Department, are investigating ways in which fertilizer byproducts could be sold to offset the costs of maintaining the newer treatment system.

CHRIS POWELL

a FLOOD of memories

When Hurricane Floyd inundated eastern North Carolina, wildlife enforcement officers worked long hours to help out. Their presence on the scene often meant the difference between life and death.

What no one foresaw was that the massive flooding from Hurricane Floyd would render conventional rescue and law enforcement units all but helpless. During a few nightmarish days in September, 30,000 homes were flooded; entire communities became cut off; frantic motorists were swept off streets; and barely any rescue personnel had boats. Into this chaos stepped the N.C. Wildlife Resources Commission's wildlife enforcement officers. They arrived with an assortment of shallow-draft, heavy-duty patrol craft and—more important—the ability to operate them in difficult situations. Some eastern wildlife officers left their own flooded homes to help with the evacuations; other officers came from the more western sections of the state. But all had to perform their duties in unfamiliar surroundings that included high water, strong currents, dangerous voltage, floating fuel and short tempers. As one officer put it, "These working conditions were the most hazardous any of us had ever experienced." It is estimated that wildlife officers were responsible for rescuing more than 1,000 people during the floods.

In the following pages are first-person accounts from a few of the 128 officers who answered the call during those trying days. These recollected snapshots span a full range of emotions: courage, desperation, triumph, loss and even humor. —*Chris Powell*

FLOYD'S FURY

floating by flooded houses

We are **bombarded** so often by the words "devastation" and "tragedy" that they tend to lose their personal applications. Floating by flooded houses along the Tar River and looking through the windows into the lives of the people who lived there drove home the true meaning of those words. Losing a house and its furnishings is a tremendous loss. But the loss of family portraits or a child's refrigerator art or an heirloom quilt—these are the very things that transform a house into a home. Their loss is a tragedy; that is devastation.

Sgt. Dale Caveny, Surry County

Shortly after I arrived, a call was dispatched to Pender County about a baby and her parents trapped in their boat near the N.C. 53 bridge, where the water was rising. I rushed to the area with Sgt. Kenneth Bell. We jumped in a boat and navigated through the rushing water to the family. When we got there, we found a 6-week-old baby, her parents and the grandparents sitting in their stalled boat. They were holding onto a tree because of the raging water. We maneuvered our boat near them and began to slowly load them in. I tied their boat securely to the tree and then took the baby. We then proceeded back to the road through the rushing water. I had to operate at full throttle to keep from being swept down the river. We soon made it to the road, and everyone was safe.

Senior Officer Timothy R. Bullock, New Hanover County

raging water

On Sept. 23, I assisted CBS News and the Associated Press with a story concerning more than 200 cows killed by flooding along the Tar River in the Sunnyside area. I carried the reporters out to this area by boat and three of these cows were found alive. They survived the flooding by knocking down the door of a trailer and going inside. This story made national news.

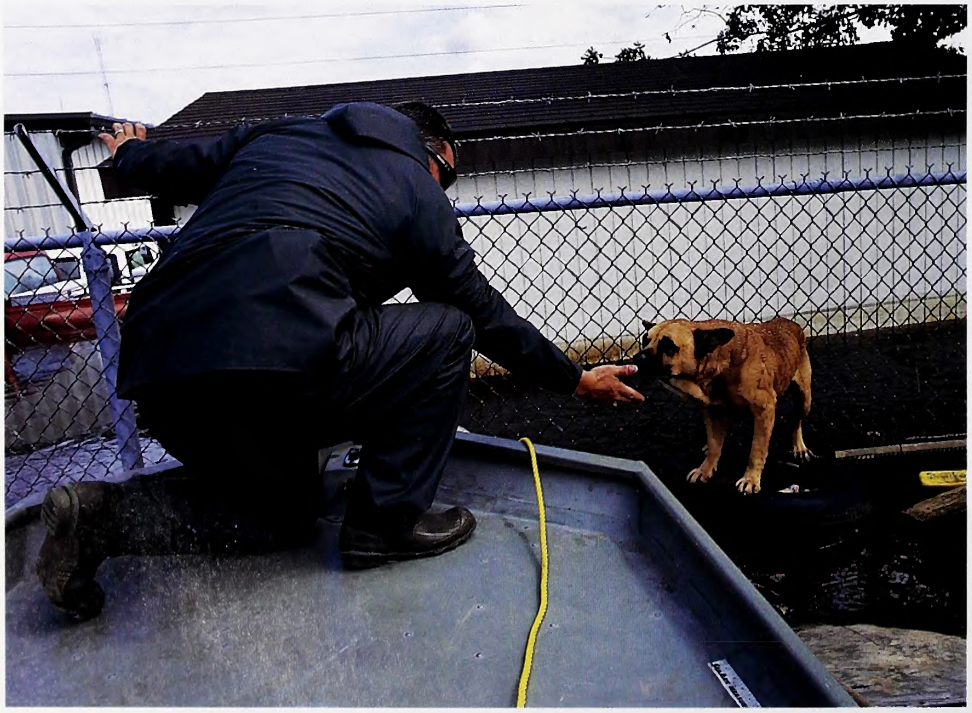
Sgt. Conley Mangum, Pitt County

THEY SURVIVED THE FLOODING

One of the most unusual and eerie things I witnessed was when the power was restored. The lights came on in some of the homes that were completely under water.

Master Officer Mitchell Little, Davidson County

Master Officer Edward Austin Jr. locates a dog that survived the flooding by straddling a floating tire.



A couple of canned sausages was all it took to coax

All animals, wild or domestic, were on their own to survive the first few days of the flooding. After all human lives were taken care of, we spent time assisting these creatures in their time of need. Deer found high ground where they could. But the smaller animals had to do with whatever they could find. Cats climbed trees, dogs swam to rooftops and I even found a rabbit sitting on top of a road grader. At one point, I had a rottweiler, a Chihuahua, a cat and a rabbit in my boat. Even that combination showed cooperation in order to reach safety.

Master Officer Steven J. Long, Jones County

At 5 a.m. the phone rang—it was the 911 center requesting help. A vehicle had driven into the floodwater that night and the people were stranded on top. We had to launch the boats on the highway. Our first boat became caught in the current and was stuck. We were able to get my boat launched and Officer Roy Hobbs jumped in with me. We started toward the area slowly due to the hidden dangers beneath the water and the darkness of the night. We could hear the flood victims yelling for help. They had been washed off the highway, downstream. We found three people on top of a Range Rover with only about 3 inches of the roof showing, and the water still rising. The Range Rover was in a very strong current. We had only one chance to swing the boat around and get to them without being washed downstream. I pulled up beside them, keeping the 60-horsepower motor at three-fourths power just to stay even with the vehicle. Officer Hobbs helped the people into the boat. It took full power to get us back up stream and deliver them to safety.

Master Officer J. Ashley Thompson, Stanly County

On Sunday the 19th, while working the evacuation of a road in Pender County, I received a radio transmission that a person had contacted the sheriff's dispatch office and threatened to shoot the next boat that went by his house. I knew the man, and advised that I would talk to him before we brought any evacuees by his residence. The fellow's house is about 4 or 5 feet above the road, and this day there was nearly 9 feet of water over the road. We boated right up to his front porch and could see that the fellow was nearly in tears. He greeted us by name and admitted to making threatening statements. He then commented that he just didn't want to have any more water washed through his house. We agreed to limit boat traffic and monitor the new "no wake" zone, and he agreed not to shoot at the next boat that came by.

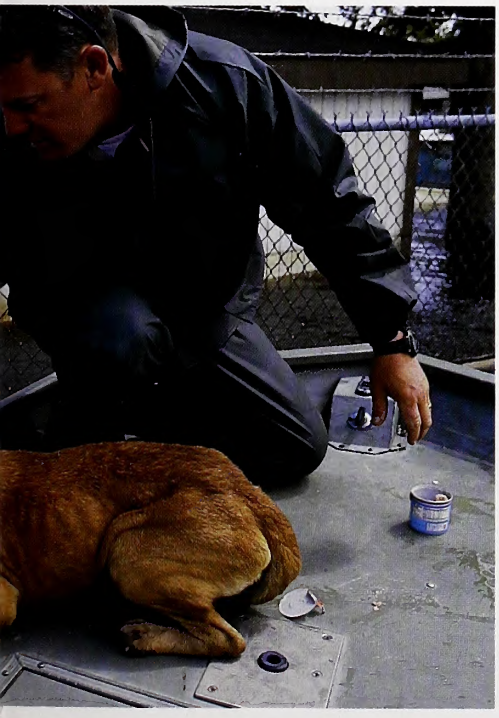
Senior Officer G.C. Hatcher, Duplin County

darkness of the night

On the Greenville detail, I saw many unusual things—one being largemouth bass and crappies swimming in ditches along the roadsides. Another unusual sight was a sign that read, "Welcome to Fantasy Island, You Loot We Shoot!" The sign was located on a high spot of land in a community that flooded.

Officer M.S. Minton, Rowan County

this hungry pooch aboard.



The dog appears ready to go on patrol with Maj. Kenneth Everhart (left) and Master Officer Austin.

PHOTOS BY LAWRENCE S. EARLEY

One couple refused to leave their make-shift home in the top of a tobacco barn, unless their animals could come with them. We decided that it was worth the extra effort to get them to safety. Accompanying the couple was a pet parade consisting of four dogs, two horses, one billy goat, one pot-bellied pig and one miniature horse (3 feet tall at the top of his back).

The story unfolded in this way: Sgt. James Ward, officers Patrick Browne and Robert Sharpe and myself helped load the lady and her dogs into the boat. Then they assisted the man with loading the goat, which walked into the boat, no problem. Next came the pig which appeared would cooperate, but quickly changed its mind, even though it could just barely keep its snout out of the water on the barn floor. A wrestling match ensued between the owner and the pig, and the soaked owner emerged victorious.

At that point, we discovered why the pig didn't want to get into the boat. Apparently the pig and the goat were not on the best of terms. The goat began to butt the pig with an all-out effort either to send him swimming or make pork chops. We finally were able to tether the goat, without provoking an attack on ourselves. The man then climbed aboard one of the horses and the other followed.

Next, Lt. Mark Bruton and Officer Mark Fox arrived on scene in one boat, with Officer John Reams and two Edgecombe County deputies in another. As we started to high ground, the goat decided that if he must ride with a pig, then he was getting out. The goat went overboard, but Officer Reams came to the rescue. After an ordeal that bore a resemblance to an alligator fight, "Billy" was safely boarded into Officer Ream's boat.

Meanwhile, Lt. Bruton and Officer Fox were attempting to rescue the miniature horse. We looked back and saw Officer Fox on the bow of the boat trying to hold the horse in what looked like a shag dance where both wanted to lead. Fox was finally able to win the horse over, not with force but with peanut butter and jelly crackers.

Everyone finally made it to high ground, and we left a very thankful couple with their animals.

Capt. Ken Craft,
Nash County

swept downstream

A person had tried to cross the Tar River, near Greenville, by walking over a bridge. The problem was that the bridge was under water, and the current was very swift. The man had crossed about halfway, when he was swept downstream and into some trees. He managed to climb one of the trees and hold on until help could arrive. That circumstance, in and of itself, wasn't unusual during the floods. But as Senior Officer Brent Ward and I were going out to rescue this man, we noticed that a rabbit had managed to climb up on one of the bridge rails and was completely surrounded by water. After we rescued the man, we decided that if the rabbit was still on the rail when we returned we would attempt a double rescue. Sure enough, the rabbit was still there and we were able to maneuver the boat close enough to make a successful grab. The rabbit seemed real glad to see us; he didn't put up any fight.

Sgt. Tony Sharum,
Rowan County

the transformer was energized in 8 feet of water with 230,000 volts

LAWRENCE S. EARLEY

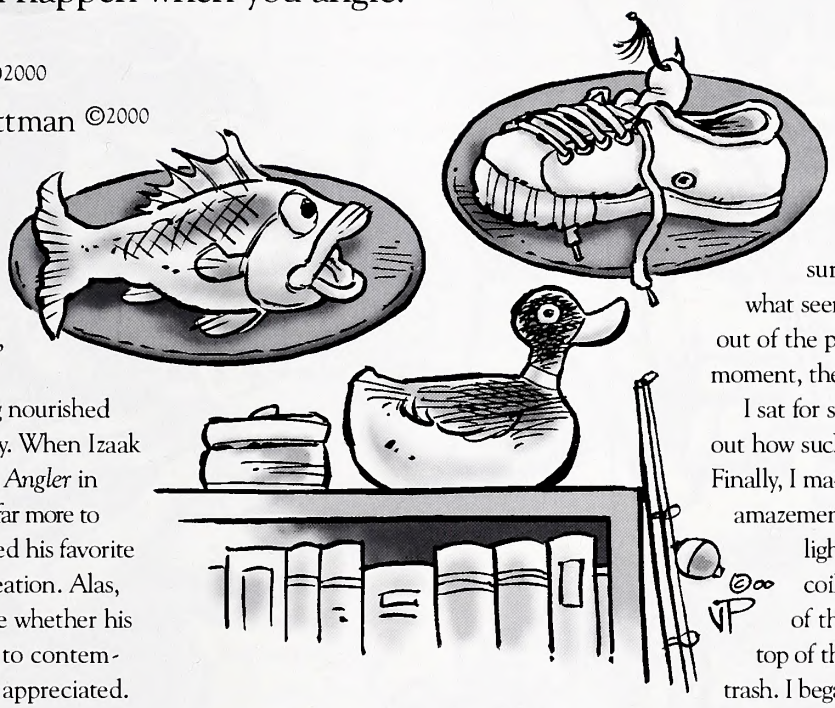
While patrolling U.S. 264, I was approached by Greenville utilities personnel who requested my patrol boat be used to assist in getting power back in Pitt County and the city of Greenville. I proceeded with utilities personnel to the power substation. The engineers worked on the station, while I assisted the line crews with getting supplies from the utilities warehouses which at the time were under 6 feet of water. Numerous boat trips were made to the warehouses. This equipment was badly needed to get downed power lines up. Power was restored to Greenville at 8 a.m. This was a monumental feat, because the transformer was energized in 8 feet of water with 230,000 volts. The relay switch was located in Wilson.

Master Officer Milton R. Jones,
Pitt County

crazy Fishing

Strange things can happen when you angle.

written by Jim Dean ©2000
illustrated by Jackie Pittman ©2000



Most fishing trips are pretty ordinary. We catch something or we don't, and, either way, we return home largely content, having nourished our obsession yet another day. When Izaak Walton wrote *The Compleat Angler* in 1653, he recognized there was far more to fishing than fish, and he called his favorite pursuit a contemplative recreation. Alas, his discourse does not divulge whether his angling ever gave him more to contemplate than he anticipated, or appreciated. Certainly, mine has.

There was that time, for example, when one of my casts wound up in the creek behind a pond's dam, having traveled all the way through the drainpipe. Now, that was something to contemplate. Some of my catches have also been a bit unusual. Then, too, there was that business that took place in a roadside ditch when... well, I'll get to that later.

The drainpipe incident took place years ago on an unseasonably warm winter afternoon. Given the time of year, I had no great expectations, but I thought I might be able to dredge up a bass or two in a nearby pond by fishing a weighted plastic worm in the deep water along the dam. Besides, it was a pleasant day to be out. After going nearly an hour without a strike, however, I sat down opposite the drainpipe and began casting methodically, reeling very slowly. One other fisherman showed up, but he wasn't catching anything, either.

I was daydreaming when I felt the unmistakable thump that signals a strike. I immediately opened the bail on my spinning reel to let the bass take the worm before setting the hook. Line poured off the spool. Boy, that was one fast-moving fish. When it showed no signs of slowing down, I closed the bail and set the hook. Nothing. Must have dropped the worm, I thought. I didn't think the bass had felt the hook, so I opened the bail again just in case. Line streamed out of the guides, faster than ever. By this time, the other fisherman had walked over to watch. I set the hook a second time, but there was no resistance.

"How come your line is going into that drainpipe?" he asked.

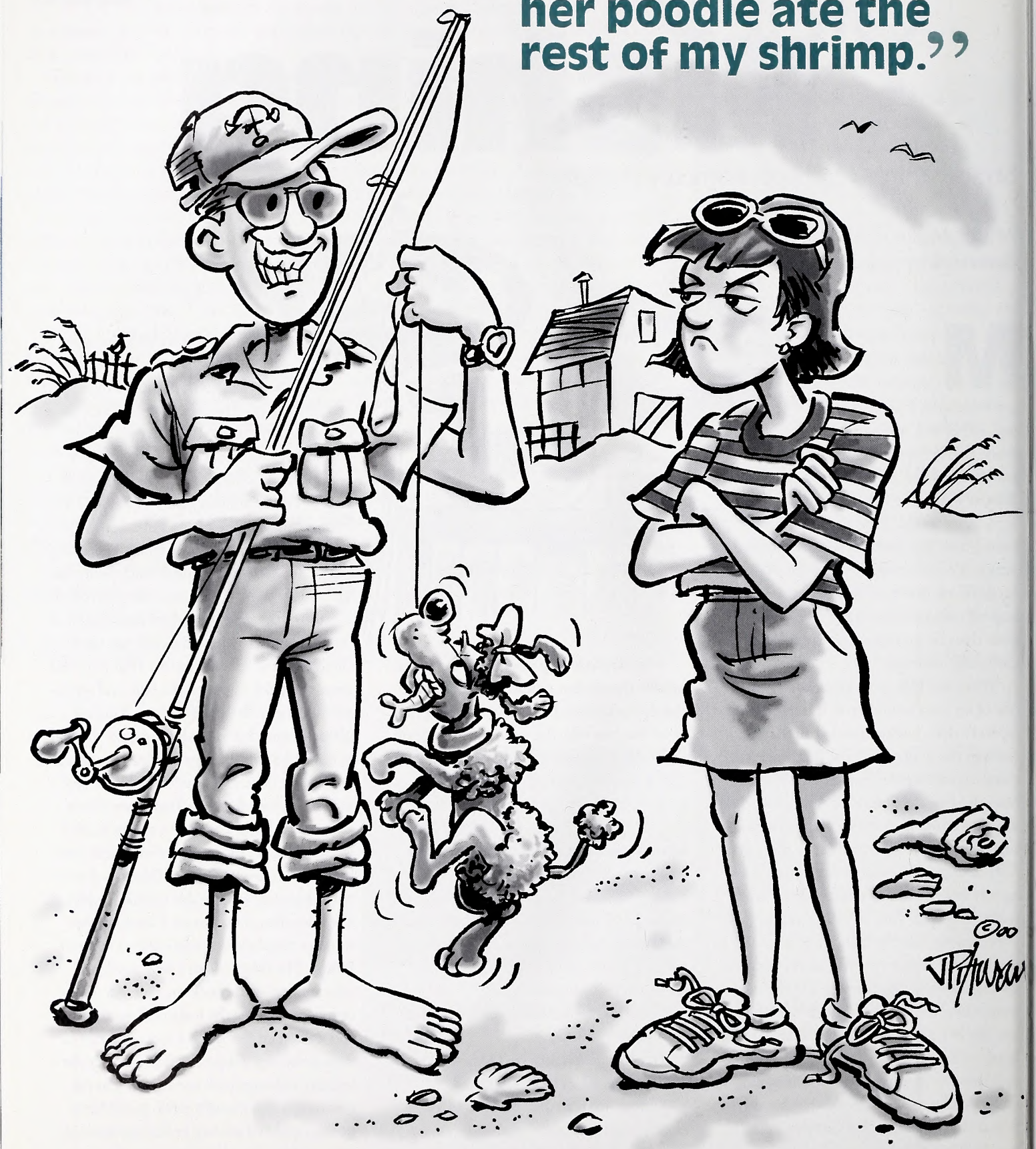
"It can't be in the pipe," I answered. "I didn't even cast in that direction."

"Looks like it to me," he said. I looked closely, and it certainly appeared that my line went directly to the top of the pipe, which was level with the water's surface. I began to reel, and, after what seemed an eternity, the worm popped out of the pipe. The fisherman eyed me for a moment, then gathered up his gear and left.

I sat for several minutes trying to figure out how such a thing could have happened. Finally, I made another cast and watched in amazement as the mystery unraveled. A light breeze slowly blew the floating coils of loose line toward the mouth of the pipe. The line drifted across the top of the pipe and lodged against a bit of trash. I began to reel and shortly saw my worm climb over the lip and plop in. That plop had been my strike. I opened the bail, and somewhere deep in the bowels of the dam, my plastic worm yanked yards of line off the reel as it raced down the pipe and into the creek behind the dam. I went home, where I eyed myself suspiciously in the bathroom mirror.

Looking back, I can see a similar logic at work behind all the strange events that have happened to me while I was fishing—there's never been any inscrutable cosmic mystery, just relentless coincidence. Consider that summer day some years ago when I was surf fishing. The fishing wasn't very good, and after reeling in to check my bait—it was untouched—I set the rod in the sand spike and walked up the beach a short distance to stretch my legs. I didn't at first connect the woman's scream with the tight arc in my spinning rod. I thought a fish could have possibly grabbed my bait in the backwash of suds, and besides, the woman was 50 yards

"While I listened attentively to some suggestions she had for me, **her poodle ate the rest of my shrimp.**"



farther down the beach, chasing a poodle.

I ran to the rod and grabbed it, at which point I noticed that my line ran straight to the dog. I had never, until that moment, considered that a poodle would eat a raw shrimp, especially one with a hook in it. Yet my instinctive reaction to set the hook wasn't without benefit since the dog, slowed by the drag, proved easier for the woman to catch on its second run (for what it's worth, poodles don't fight much, and this one never jumped even once). There was nothing to do then but give them both lots of slack line and await the consequences. Fortunately, when the lady arrived with my catch, I was able to get the hook out without using pliers. While I listened attentively to some suggestions she had for me, her poodle ate the rest of my shrimp. Hearing of this later, one friend suggested that this was a prime example of why fishermen should always carry a gaff.

Another interesting catch was far less traumatic, but it still fits the pattern. Almost no one used a fly rod in salt water 30 years ago, when I walked out one summer day on the Fort Macon jetty to try my new 9-foot, 10-weight rod equipped with a 300-grain high-density shooting head. Friendly fishermen gave me room to cast, curious to see whether I would catch anything, especially since no one seemed to be having much luck soaking bait or casting lures. I doubt they'd ever seen anyone use a fly rod in salt water. After about a dozen casts, I had a solid strike on a Lefty's Deceiver streamer fly that I had been working slowly along the bottom.

"Got one," I said, in case someone might not have noticed. The fight was strong, though sluggish, but whatever I had hooked ran off to one side a short way then reversed direction. It did this several times giving me cause to suspect that it was most likely a flounder or spotted sea trout. You can imagine my surprise when I slid a size 10½, low-heeled, canvas tennis shoe onto the rocks. It was hooked in the tongue, which was not only appropriate but also provided the fulcrum that had caused the shoe to plane first one way and then the other. It had been a convincing performance, and we all looked at the shoe for several stunned moments until finally one of the other fishermen found the right words.

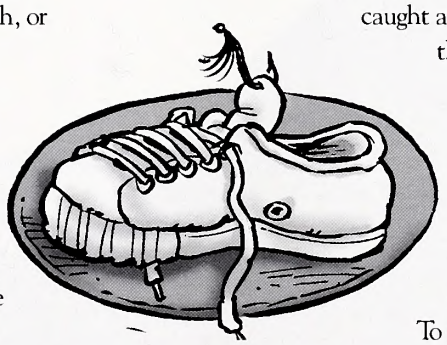
"You oughta cast back out there," he said. "Them kind normally run in pairs."

Fishermen have been catching footwear—mostly old boots—long enough for it to become a cartoon cliché, but bagging the wahoo of the genus struck everyone as being nearly unique. The same, as I was soon to discover, might be said for appliances.

Not long after I caught the tennis shoe, I was fishing for flounder on the Emerald Isle Pier with some of the regulars I had come to know over the years. We each tended several rods baited with live mullet in the slough just off the beach, and occasionally we would check a rod by reeling up the slack to see if we still had bait, or if we could feel any resistance that might indicate that a flounder had eaten the minnow. As I was doing this, I felt the line tighten. I set the hook.

"Got one," I said (this is an egocentric habit that clearly needs to be broken). The rod bent sharply, and everyone rushed to the rail to see what I had hooked. It was soon obvious that this was no flounder because we could see a wide, silvery flash now and then as the fish darted back and forth several feet down in the green water.

"Looks like a bluefish, or more likely a big pompano or jack," someone said. The drop net was lowered, and everyone waited while I struggled to gain line. Moments later, the chrome-plated top of a drinking fountain cleared the water, where it was dutifully netted and slowly hoisted over the rail. It hit the pier with a resounding clang. The hook was caught in the drain hole in the center of the fountain top which had presented it at the greatest angle of resistance, causing it to slip-slide back and forth. I don't recall precisely what was said about this catch, though there may have been some mention of a rare hybrid of a horseshoe crab and a squid that propels itself by squirting water.



There have been other experiences that, while they don't defy explanation, are clearly cause for some contemplation. Mike Gaddis and I were bass fishing one day when we pulled up to a likely looking stump. I cast to one side of the stump, while he cast to the other. He caught an 8-pound bass.

"I know why you didn't catch this fish," he said as he admired his catch, then turned it around for me to see. "Look here."

The eye socket—the eye that would have been able to see my lure—was empty.

As for the incident involving the roadside ditch, it occurred back in the 1970s when my friend Melvin Kennedy first began fly-fishing for mountain trout. Though I was not much more than a novice myself, I offered to go with him and share what little I had learned.

"Trout aren't really hard to catch if you know how to read the water and determine which spots they like," I remember telling him, no doubt quoting some famous angling author. After reading the water over a 2-mile stretch of river, Mel still hadn't caught a trout. And though he hadn't actually seen me catch one, he graciously allowed that he was certain that I had. Discouraged, we left the stream and began walking back down the road to the camp.

"I think you must have a secret fly you're not telling me about," Mel said.

"No, really, I don't," I replied. "I haven't caught any—I mean, many—and there's certainly nothing magic about this fly. You just need to get the knack of letting your fly float naturally without dragging on the surface. A dragging fly spooks trout."

To illustrate my point, I stepped over to where a tiny spring run ran through a culvert under the road. The trickle was barely 6 inches wide, and no more than an inch or 2 deep except for a bucket-sized pothole under the end of the protruding culvert. With only a few feet of leader hanging from the rod tip, I lowered the fly onto the glassy boil.

"See, you need to let it float freely like this so that…."

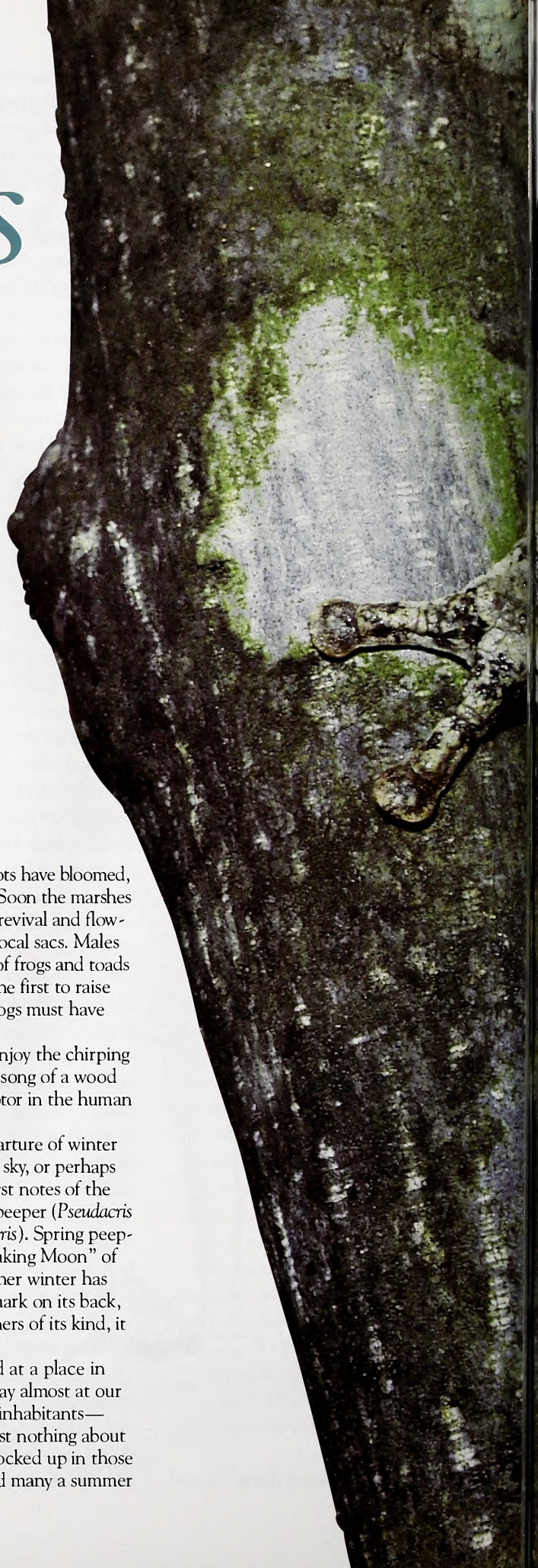
Bam! A 5-inch wild brook trout grabbed it and dangled quivering in front of us.

"Honest, Mel, I never…," I stammered.

Mel looked first at the trout, then at me. Finally, he said what any fisherman would have said.

"You're going to sell me that fly, aren't you?" ⊠

The Sounds of Spring



In the wet and lonely corners of the countryside, the spring peepers have begun their seasonal chorus. They're not the only frogs that sing a spring song.

written and photographed by Harry Ellis ©2000

When winter begins to relax its icy grip, even before the first bloodroots have bloomed, frogs begin to stir from the deathlike entombment of hibernation. Soon the marshes and wetlands are alive with their singing—songs that foretell the revival and flowering of nature. Normally only males sing, as females are not equipped with vocal sacs. Males reach the ponds first and start calling for the females to join them. The calls of frogs and toads are among the earth's oldest cries, for of all the vertebrates, they were likely the first to raise their voices in song. Long before there was birdsong, the lonely cries of the frogs must have arisen from the ancient swamps and marshes.

Most people take pleasure in listening to the songs of frogs—just as they enjoy the chirping of crickets, the babble of mountain brooks, the booming of ocean surf or the song of a wood thrush in lonely, hushed woods. It must be that some kind of an artistic receptor in the human brain responds to the batrachian chorus.

Almost everyone has his own favorite messenger to inform him of the departure of winter and the arrival of spring. To some, it may be a bluebird dropping out of a blue sky, or perhaps the blooming of a certain delicate wildflower. To me, it has always been the first notes of the little frog with the voice that sounds like the chime of silver bells—the spring peeper (*Pseudacris Crucifer*; very recently, herpetologists changed its name from *Hyla* to *Pseudacris*). Spring peepers usually make their appearance sometime in the month of March, the "Waking Moon" of the Indians. Their shrill cries of life endure, with the welcome news that another winter has passed and the earth is alive again. This little frog, with the characteristic X mark on its back, averages no more than an inch in length, yet when singing in chorus with others of its kind, it can be heard for a quarter of a mile away.

When I was a boy of seven, and for a few years thereafter, my family lived at a place in the Mountains, where, as an added attraction to me, a large woodland pond lay almost at our back door. I soon became acquainted and engrossed with all the pond's wild inhabitants—the frogs, turtles, salamanders and aquatic insects. In those days, I knew almost nothing about biology or science, yet somehow I sensed that a great mystery about life was locked up in those large translucent clouds of frog eggs that floated in the pond each spring. And many a summer

Spring brings out *the trilling voice of the rarely seen gray tree frog. Its coloration enables it to blend in with lichen-covered tree limbs, and it often climbs high into trees.*

Spring Peeper

night, as I lay in bed, the sonorous bellowing notes of the bullfrogs, along with a chorus of all the lesser frog voices, came in through my open window, the last sounds I heard before drifting into sleep. All these things opened a great door for me into the world of nature, which has never closed. Always in the corner of my memory, I will be that boy of seven.

Belonging to the order Anura, frogs and toads are found throughout all tropical and temperate lands except waterless deserts, snow-capped mountain summits and a few small Pacific islands. Nearly 3,700 species are known, with the largest number of species in the New World tropics. At least 99 species and subspecies have been described in the United States and Canada. Our own state of North Carolina, with a diversity of amphibian habitats from the Mountains to the Coastal Plain, has at least 30 species of frogs and toads.

Although many frogs can get along in moist habitats on land quite well, they must return to the water for mating and the laying of their eggs. Their ancient ties with it have never been broken, and it is in the water that their life cycle begins. When the shallow waters of the little boggy ponds have been slightly warmed by the spring sun, the female deposits her eggs while the male of the species is clasping her tightly behind the forearms. As the eggs are laid, he fertilizes them externally by releasing a flood of sperm cells over them. Within a few days, there comes from each egg a tadpole, a long-tailed creature with gills like a fish, that at first gets its nourishment from the algae that it can scrape from underwater surfaces.

Pickerel frog

The tadpole's way of life is a dangerous one, for almost every other creature that lives in the water is intent upon eating it—crayfish, turtles, red-spotted newts, water snakes, dragonfly nymphs and a host of other predators. To make up for such tremendous mortality losses, each female lays enormous numbers of eggs. The wood frog lays 2,000 or more eggs, and the bullfrog may lay as many as 20,000. A single woodland pond may hold a million eggs, but from these numbers relatively few will survive the hazardous journey from egg to mature frog. Not more than one in a hundred survives to reach adulthood, but this is enough to keep the species in the great game of life. Nature's concern is not for the individual but for the race.

When the tadpole of most species of frogs is several weeks old, a pair of elongated growths appear on the hind part of its body, which are the little hind legs of a frog, equipped with powerful developing muscles and five toes. Soon the forelegs also appear, with feet like tiny hands. Days pass and the tail grows shorter, as it is being absorbed into the body, and the gills are being replaced by lungs. Finally, the metamorphosis from tadpole to frog is complete.

Bullfrog tadpoles do not develop into frogs the first season, as do most frogs. It is not until the second season and sometimes the third that their metamorphosis takes place. Green frog tadpoles that hatch in May or June also wait until the following summer to transform.

No other vertebrate animals undergo such radical changes while maturing. At one stage of its existence, the frog is a little fishlike creature, and at a later time, it has a completely different kind of body with long, powerful legs, by which it makes long leaps in the air.

Frogs must be on the alert, night and day, to avoid being eaten by their enemies that live in and around the ponds—huge turtles; great herons wading in the shallow water; large, winding snakes ready to swallow them; hungry raccoons hunting by the watercourses. A frog almost never dies of old age.

The mature frog is a carnivorous eater with a wide mouth and a long tongue that it flicks out with lightning speed to capture insects and other small creatures. A frog is interested only in moving prey—the flutter of a small moth, the scramble of a grasshopper, the wriggle of an earthworm or the swoop of a dragonfly. Large frogs such as bullfrogs will eat almost anything they can catch and swallow, including smaller frogs, baby turtles, crayfish, meadow mice and even small birds.

With the passing of summer and the coming of autumn, frogs are impelled by some profound and mysterious force to seek out a secluded site for spending the winter in the deathlike oblivion of hibernation, thus escaping the impossible task of finding food and shelter in an icebound world. Bullfrogs, green frogs, pickerel frogs and leopard frogs plunge into the water and burrow into the mud of a pond bottom, where all body functions are suspended and breathing stops. All the oxygen needed will be absorbed through the naked skin.

Another group of frogs—wood frogs, gray tree frogs, spring peepers, cricket frogs, American toads and some others—hibernate on land, in and under mossy logs, in cavities in stumps or burrowed down under the leaves and debris of the forest floor. The frogs with a land-based hibernation are subjected to freezing temperatures, but to prevent being frozen solid, their bodies produce glycerol—an alcohol actually used in several brands of commercial antifreeze. Besides, these frogs seem to be able to tolerate partial freezing without permanent damage.

Northern Cricket frog

For hibernating frogs, the spark of life sinks so low that it almost goes out, hovering on the shadowy line that divides the living from the dead. Scientists probably know more about the rings of Saturn than about the deeper mysteries of hibernation.

Eventually the months of winter pass, and in lengthening days filled with sunshine the frogs bestir themselves and come forth to join the procession of life now beginning. Soon the marshlands will be loud with their singing. For them, winter has passed as if it were but a single night.

Most people are more familiar with the songs of frogs than with the appearance and activities of singers themselves, but the natural history and habits of many of our common species are highly interesting and are a field for further study.

Many frogs live in or near the water, but

the wood frog (*Rana sylvatica*) spends most of its adult life in the deep woods, where its reddish brown coloration and dark eye mask blend so well with the brown fallen leaves that it is practically invisible. They are among the first frogs to reach the breeding ponds, where their calls sound like the quacking of a flock of ducks.

The pickerel frog (*Rana palustris*) lives near ponds and brooks where it hides among carpets of ferns and other vegetation. With a double row of nearly square brown spots on its back, it is a very handsome frog.

Green frog

The leopard frog (*Rana pipiens* or *Rana sphenocephalo*) is brown or green, with two rows of rounded dark spots on its back. It makes long, flying leaps when alarmed.

The green frog (*Rana clamitans*) lives in and near the water, seldom venturing far from it. It looks like a small bullfrog, and its song sounds like the twanging of a loose banjo string.

The largest frog in North Carolina is the bullfrog (*Rana catesbeiana*). It's about 8 or more inches long and weighs 3 pounds. Its deep resonant "jug-o-rum" call, sometimes sounding like the roar of an angry bull, echoes over the wetlands. It is our most aquatic frog, spending its entire life in and near the water. Bullfrogs are hunted by man for their delicious hind legs.

The gray tree frog (*Hyla versicolor*) is patterned to resemble lichen-encrusted tree bark. It often climbs high in trees, sometimes taking refuge in knotholes.

The cricket frog (*Acris crepitans*), a non-climbing member of the tree frog family, breeds in shallow ponds in early spring, where its cricketlike song is heard.

Except for a brief breeding season in the water, the American toad (*Bufo americanus*) is a creature of dry uplands and garden soil, where it is a valuable friend to the farmer, eating an almost unbelievable number of insects, most of them garden pests. Its flutelike musical trill is heard in early spring.

Through eons of time, frogs and toads have been highly successful in their struggle for survival. But within the past decade, scientists throughout the world have become aware that many species of these amphibians have mysteriously disappeared from habitats in which they were recently abundant. This is happening throughout the world, including North America and the southern Appalachians. Nobody knows why, or why they are gone from some ponds and lakes and not from others that are situated nearby. Many ponds that once echoed with thousands of frog voices in the springtime are now silent as the grave, and there are no frogs that plunk into the water as an observer walks by the shore. A global task force was set up in 1991 to study the problem. A number of possible causes are being explored, including acid rain, ultraviolet radiation, global warming, the runoff and accumulation of pesticides in freshwater ponds, predation and disease. All these things are being studied, but answers are slow in coming.

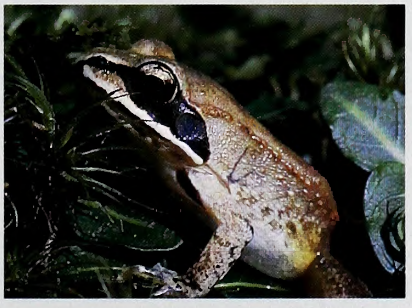
It has long been known, of course, that the greatest dangers we face in wildlife protection are man's greedy exploitation of the environment and the loss of our wetland habitats by the draining of swamps and marshes in the name of progress.

Although most species of frogs are still quite abundant and in no danger of extinction, a dark shadow sometimes steals across the mind, like a bad dream. Suppose the time should come when all the frogs are gone, with a strange, eerie silence brooding over the swamps and wetlands. Only then will we realize the true worth of the wild treasure we have lost and how much poorer we are for its passing. ⊠

American Toad

Metamorphosis!

One of the most familiar and startling of Nature's mysteries is the different physical stages a frog goes through to become an adult. The wood frog below begins life in a woodland pond as a single egg among a mass of eggs, as many as 2,000. In a couple of weeks, the eggs hatch into swarms of tadpoles that feed greedily and breathe through gills. In about five to eight weeks, those that survive the pond's many predators will gradually sprout limbs and lose their gills and tails. Finally, the fully developed frog is able to breathe with its lungs and leave the pond.



Imagine finding yourself in a place where nothing looks familiar. There are no signs, no maps, no people to ask directions. How will you decide what path leads home? Will you look up to the sky and choose a direction toward or away from the sun? What if it's a cloudy day? Will you follow a stream or head for a distant mountain?

Finding the Way Home

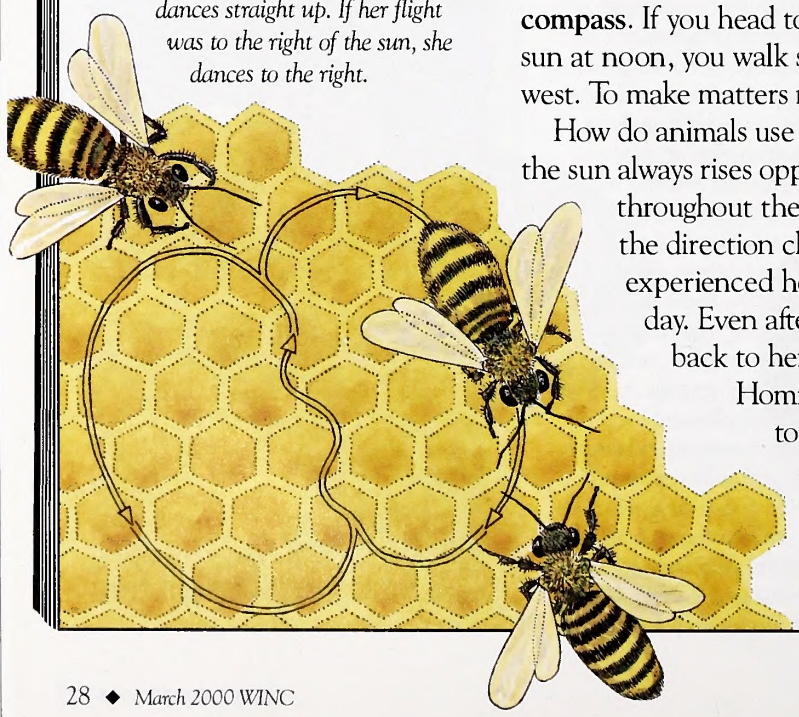
written by Buffy Silverman / illustrated by Consie Powell

HOMING BEHAVIOR

Every time an animal takes a journey it must find its way home. Some trips are short; other journeys are long. How do animals find their way from one place to another?

Biologists studying homing behavior know that animals rely on many different cues to **orient** themselves. Animals that use the sun for direction must have a back-up system on cloudy days. Night-travelers must have a way to keep their bearings when the stars are not visible. Ocean voyagers must keep on track even when wind and currents blow them off course.

Some animals **navigate** by following things that humans cannot sense without special tools. The earth's magnetic field or a scent in a river can lead animals home.



A honey bee tells other bees where to find food by dancing. If she found food by flying toward the sun, she dances straight up. If her flight was to the right of the sun, she dances to the right.

FOLLOWING THE SUN

You might think the sun would make the perfect **compass**. If you head toward the sun at noon, you walk south. But if you keep following it, by afternoon you turn west. To make matters more complicated, the sun's path changes with the seasons.

How do animals use the sun as a compass? Honeybees are born knowing that the sun always rises opposite from where it sets, and that its direction changes throughout the day. They learn through experience exactly how much the direction changes each hour of the day. Using an **internal clock**, an experienced honeybee knows where the sun should be at any time of the day. Even after wandering from flower to flower, she can make a beeline back to her hive by noting the sun's position.

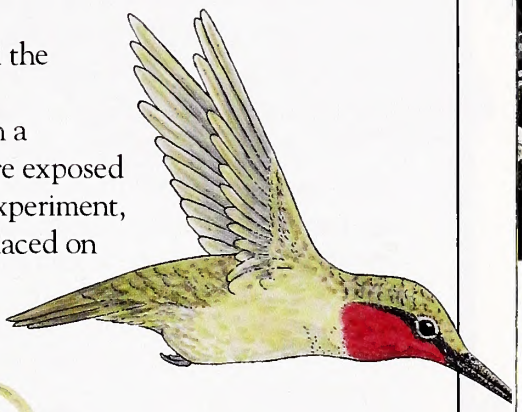
Homing pigeons also use the sun and their own internal clocks to tell which direction to fly. If a pigeon journeyed west, it knows it must return home by flying east. Which way is east? At 6 a.m. it is towards the sun. At noon, it is 90 degrees to the left of the sun. At 6 p.m. it is away from the sun.

MAGNETIC PULL

Honeybees, pigeons and other sun watchers must find their way home on cloudy days. These animals have a back-up compass to use—they can tell direction based on the earth's **magnetic field**. They sense whether they are heading toward the earth's poles, or toward the equator.

How do biologists know that birds and other animals navigate with a "magnetic compass"? By changing the magnetic field that animals are exposed to, biologists can affect the direction that an animal travels. In one experiment, tiny helmets fitted with coils that produced a magnetic field were placed on homing pigeons. On cloudy days, the pigeons flew in the wrong direction because of the changed magnetic field around their heads. But on sunny days the birds could not be tricked. They used their solar compasses and flew home.

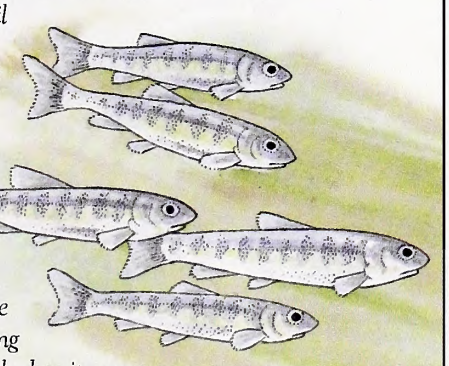
Distance travelers such as the yellow-rumped warbler, white-throated sparrow and ruby-throated hummingbird call North Carolina home for only part of the year.



THE NOSE KNOWS

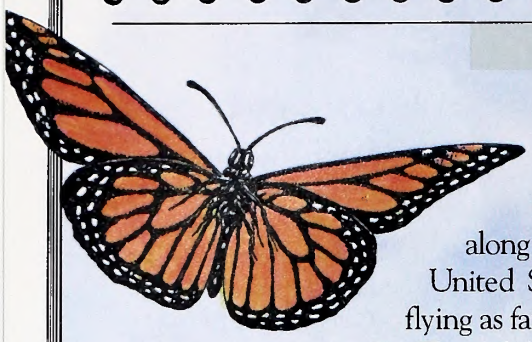
Before laying eggs, fish need to find the right habitat for their young. Many return to their birthplaces when they are ready to **spawn**. How do they find the streams where they were born? Salmon, trout and other fish sniff their way back from oceans and lakes.

When a salmon is very young, it learns the special smell of its stream and remembers that smell for its entire life. Plants, animals and soil all contribute chemicals that make up this scent. Then the salmon travels thousands of miles down river and out in the ocean. At the end of its life, the salmon returns, following the scent trail it learned when it was young.



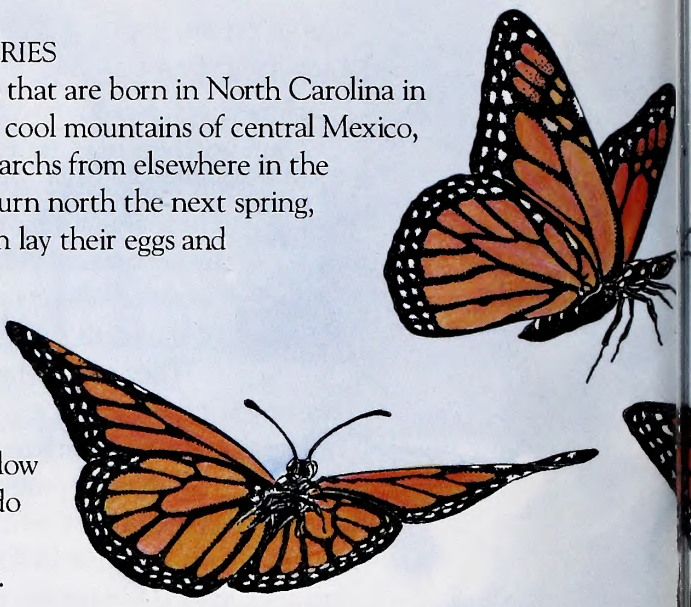
STAR GAZING

Many birds migrate at night. In the fall, young birds instinctively know to fly south because of their magnetic compasses. But the birds also learn which way is north and south by looking at the patterns of stars rotating in the sky. Once birds can tell direction from the stars, they use that information to check their magnetic directions.



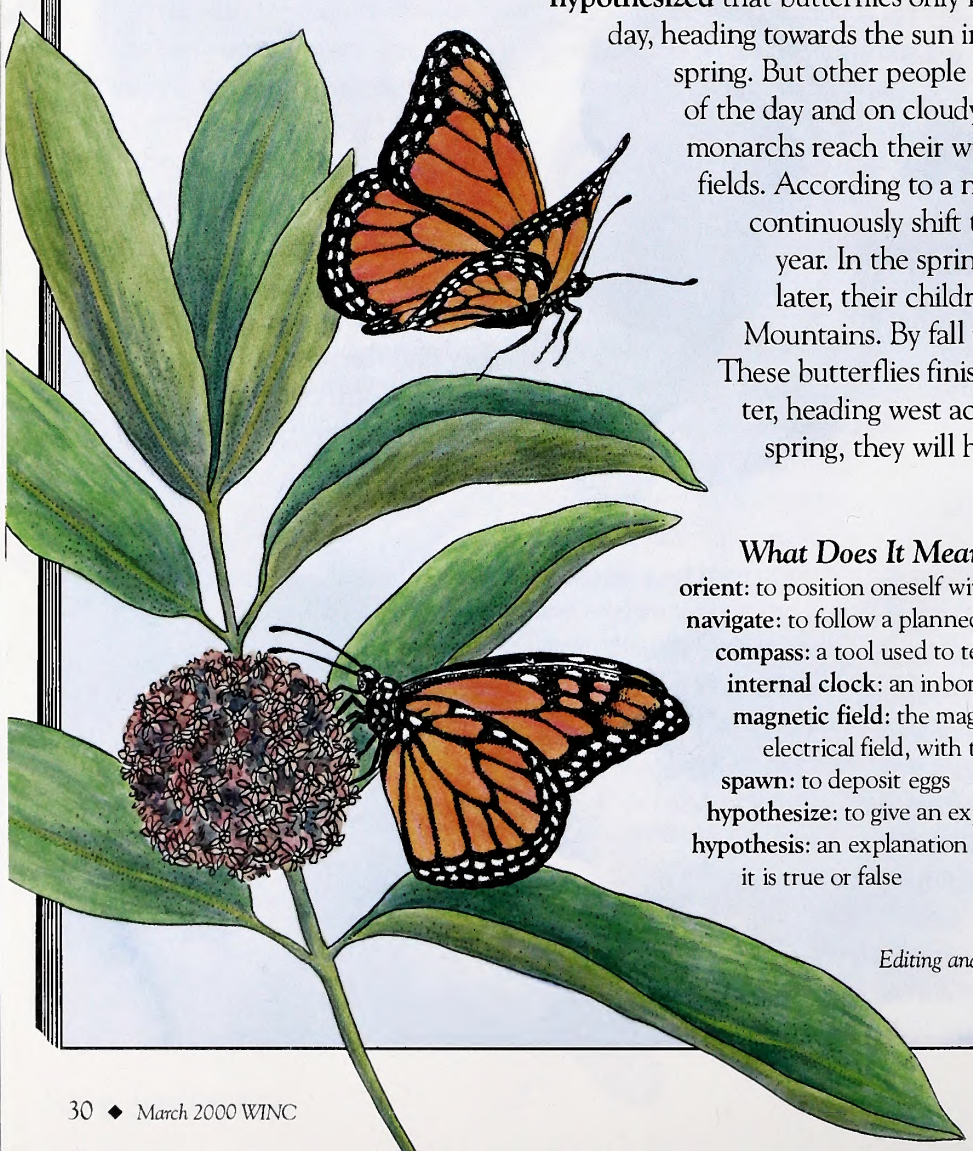
MIGRATION MYSTERIES

Monarch butterflies that are born in North Carolina in late summer migrate to the cool mountains of central Mexico, along with millions of other monarchs from elsewhere in the United States. These butterflies return north the next spring, flying as far as Louisiana or Texas, then lay their eggs and die. Their children fly farther north and east. By summer's end, monarchs flutter in fields across the East and Midwest. They gather together and head southward to the mountains of Mexico where their great-grandparents spent the previous winter.



How do monarchs know which way to fly? They cannot follow older monarchs, since those that migrate north in the spring do not live long enough to return south. They must inherit this knowledge, but no one knows exactly how they find their way.

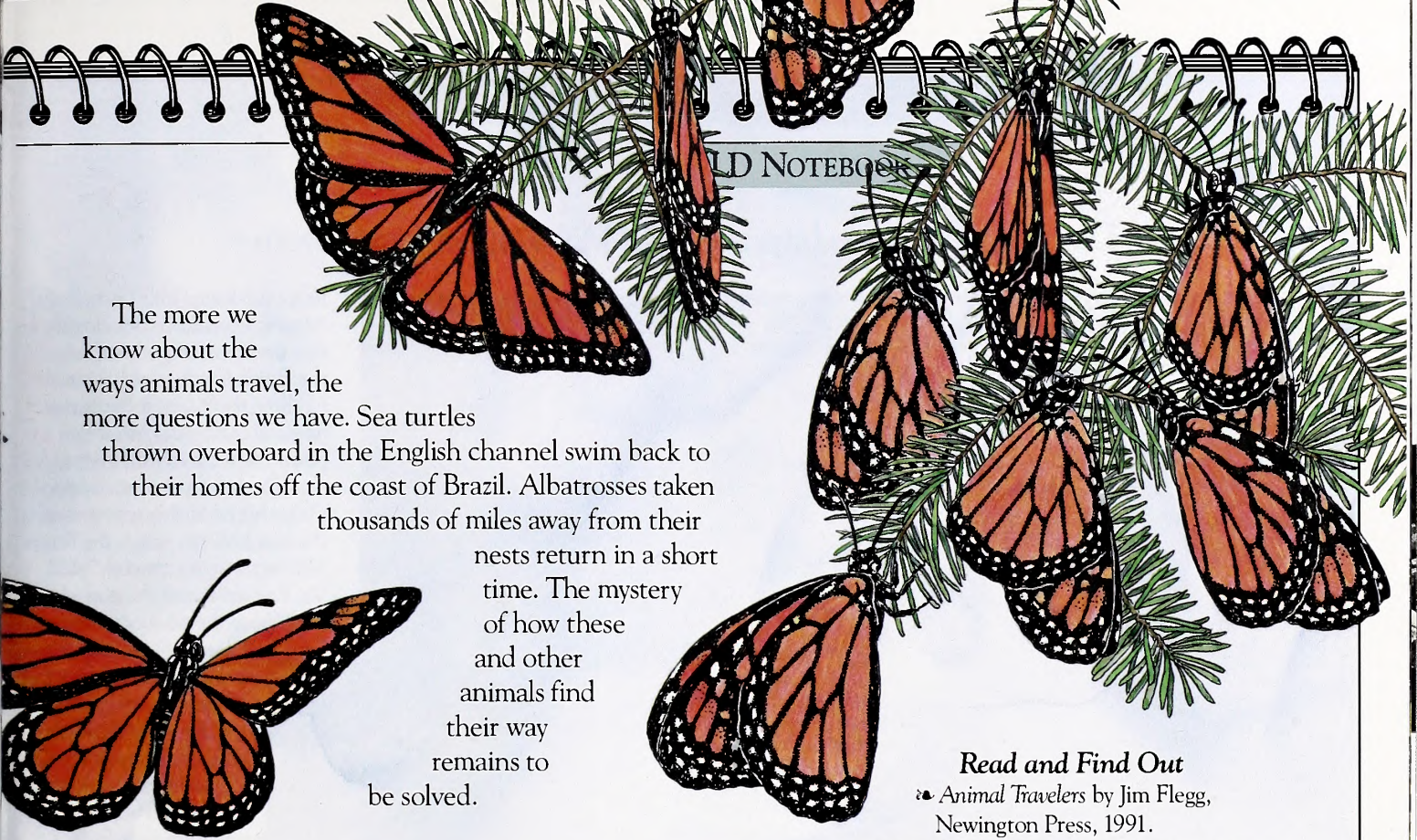
Some monarch experts **hypothesized** that butterflies only fly a few hours a day, heading towards the sun in the fall and away from it in the spring. But other people found monarchs flying at all hours of the day and on cloudy days. Other experts suggested that monarchs reach their winter homes by sensing magnetic fields. According to a new **hypothesis**, monarchs continuously shift the direction they fly throughout the year. In the spring, monarchs fly north. Three months later, their children head east across the Appalachian Mountains. By fall their children's children turn south. These butterflies finish their migration at the start of winter, heading west across Mexico. When they fly again in spring, they will head north.



What Does It Mean?

orient: to position oneself with respect to a point of reference
navigate: to follow a planned course
compass: a tool used to tell geographic directions
internal clock: an inborn way of keeping time
magnetic field: the magnetic forces found around a magnet or around an electrical field, with two magnetic poles. The earth has a magnetic field.
spawn: to deposit eggs
hypothesize: to give an explanation of observations that can be tested
hypothesis: an explanation of observations that can be tested to learn whether it is true or false

Editing and design by Consie Powell.



The more we know about the ways animals travel, the more questions we have. Sea turtles thrown overboard in the English channel swim back to their homes off the coast of Brazil. Albatrosses taken thousands of miles away from their nests return in a short time. The mystery of how these and other animals find their way remains to be solved.

Get Outside

Find some ants: Ants mark trails with chemicals. When an ant finds food, other ants follow her trail. They follow chemical trails back to the colony.

Place a piece of fruit or a cube of sugar near an ant hole. Watch the path that ants take to reach the food. Is it a straight or curving trail? Do all ants follow the same route? What happens if you move the food? Try blocking the trail.

Start a monarch journal: You can raise a caterpillar that will become a monarch butterfly. Keep track of the caterpillar's growth. When the butterfly emerges from a chrysalis, release it to mate or migrate with other monarchs. Tips for monarch projects are found in *Monarch Magic* by Lynn Rosenblatt.

Get WILD

Advanced WILD Workshops:

April 7-8 – *Salamanders*, New River State Park . Contact Judy Bumgarner, (828) 262-3185.

April 11-12 – *Black Bears*, Stone Mountain State Park. Contact Edward Farr, (336) 957-8185.

April 13-14 – *Living With Wildlife*, State Forestry Training Center, Crossnore. Contact Anne Hice, (336) 674-6152.

April 21-22 – *Neotropical Migratory Songbirds*, Morrow Mountain State Park, Albermarle. Contact Mel Porter, (704) 982-1523.

May 6-7 – *Migratory Songbirds*, Howell Woods Environmental Learning Center, Four Oaks. Contact Howell Woods, (919) 938-0115.

June 2-3 – *Foxes, Wolves, Coyotes*, SciWorks Environmental Center, Winston-Salem. Contact Kelli Johnson, (336) 767-6730.

Read and Find Out

- *Animal Travelers* by Jim Flegg, Newington Press, 1991.
- *Home at Last* by April Pulley Sayre, Henry Holt, 1998.
- *Into the Sea* by Brenda Z. Guiberson, Henry Holt, 1996.
- *Monarch Magic* by Lynn M. Rosenblatt, Williamson Publishing Co., 1998.
- *Salmon: Tireless Travelers* by Andreu Llamas, Gavriel Casadevall and Ali Garousi, Gareth Stevens, 1996.
- *They Swim the Seas: The Mystery of Animal Migration* by Seymour Simon, Browndeer Press, 1998.
- In *Wildlife in North Carolina*
- "Neotropical Migrants" by Harry LeGrand Jr., November 1989.
- "Mysteries of Migration" by Joel Arrington, May 1990.
- "Columbus and the Birds" by David S. Lee, October 1992.
- "How Do Birds Tell Time?" by Lawrence S. Earley, October 1992.
- "Eel Excursions" by David S. Lee, March 1997.

It's WILD!

Project WILD Activities for teachers and students that correlate to this topic include:

Migration Barriers: teaches students to understand possible impacts on wildlife migration as a result of human activities.

Hooks and Ladders: teaches students to understand the complexities of fish migration.

Migration Headaches: teaches students about limiting factors affecting populations of migrating water birds.

Dam Blown Up to Improve Fish Habitat in Neuse Basin

KEN TAYLOR

***For 71 years, an** intact Rains Mill Dam (inset) blocked fish migration on the Little River in Johnston County. That changed in December when U.S. Marines used plastic explosives to reduce the dam to rubble. Marines (above) survey their handiwork after blowing an initial 15-foot wide gap in the concrete dam.*

Edited by Chris Powell

Striped bass, sturgeon and shad will be able to access nearly 50 more miles of their traditional spawning grounds this spring thanks to the destruction of an aging Johnston County dam.

In December, U.S. Marines used plastic explosives to blow a hole in the 71-year-old Rains Mill Dam spanning the Little River as part of a training exercise. The Marines then used additional explosives to reduce the 250-foot long concrete dam to rubble.

"This may be seen initially as an act of destruction," declared U.S. Department of the Interior Secretary Bruce Babbitt, who helped give the order to blow up the dam. "But it is an act of restoration, an act of re-creation, bringing back an ecosystem, a river system and its fisheries."

The Little River—a major tributary of the Neuse River—once supported spawning stocks of striped bass, alewife, American and hickory shad and sturgeon, as well as large populations of freshwater mussels. However, dams, including the one at Rains Mill, have isolated mussel populations and blocked the upstream migration of fish from the Atlantic Ocean for decades.

The Rains Mill Dam is the third dam in North Carolina—and in the Neuse basin—to be removed for environmental reasons in the past two years. The Quaker Neck Dam, which spanned the Neuse River near Goldsboro, was removed in December 1997. The state also removed a smaller dam on the Little River near Cherry Hospital in 1998. The N.C. Division of Water Resources has been the lead agency in the removal of the dams.

"These projects have opened up over 1,000 stream miles of the Neuse and its tributaries to fish spawning," said Bill Holman, secretary of the state Department of Environment and Natural Resources. "This dam removal puts three under our belts. Maybe we are gaining a reputation as a dam-busting state."

It took a partnership of local, state and federal groups to remove the Rains Mill Dam, located near Princeton. But no partner was more important than the Rains family, which agreed to allow their dam to be demolished after decades of service powering a family-run gristmill.

"The last time so many people gathered at this spot was in the late 1970s to watch the Rains Mill burn to the ground," said Vic Rains. "It was the end of an era. Today, we no longer need to harness the river for man's use, so we are happy to see it return to its natural course and to see a new opportunity for its potential as a recreation area."

Besides opening up 49 miles of stream for fish spawning, the removal of the Rains Mill Dam also helps restore and protect rare freshwater mussels living in the river.

Despite being broken up by dams, the Little River has one of the highest remaining diversities of freshwater mussels of any stream along the Atlantic Seaboard, explained John Alderman, a nongame biologist with the N.C. Wildlife Resources Commission. The Little River—along with nearby Swift Creek—provides a refuge for more than a dozen freshwater mussel species including the federally endangered dwarf wedgemussel and the Tar River spinymussel. Once common throughout North Carolina, freshwater mussels as a group contain some of the most endangered species on earth.

"We very much need to conserve the Little River if we are ever to restore the lower Neuse River basin," explains Alderman. "We must preserve this refuge area to one day repopulate the entire basin once the water quality is restored."

—Rodney Foushee

New Museum of Natural Sciences to Open

Billed as the largest of its kind in the Southeast, the new North Carolina Museum of Natural Sciences in downtown Raleigh will open its doors for the first time on April 7. To celebrate the historic occasion, the museum is planning a non-stop grand opening, dubbed "A 24-Hour Trek—Join the Adventure."

"We've built a new museum for the new millennium and we want to open with a splash," said Museum Director Betsy Bennett. "This will be the first round-the-clock opening event in the state's history. It's especially fitting for a natural science museum, because nature never sleeps."

During the grand opening, visitors can explore the building while enjoying a mix of entertainment and activities. The event includes live music, short interpretative programs, live animals, hands-on activities, crafts, food and films. Activities and entertainment will be free, and vendors will offer a variety of foods for sale.

The event begins outside the museum at 5 p.m. on April 7 with opening ceremonies and the premiere of "Cherish Your Land," an environmental hymn written for the opening.

Later, two stages will feature a mix of musical styles, including Carnivalito, playing Latin and salsa dance tunes; local rock band Hobex; and the Coastal Cohorts, performing songs of the North Carolina seaside. In addition, five outdoor areas will feature activities designed around the themes of the museum: *Coastal Carolina, Mountains to the Sea, Tropical Connections*, the *Arthropod Zoo* and *Prehistoric North Carolina*.

After nightfall, the museum will move activities inside and unveil "In the Dark," its first traveling exhibit. Attendees will see star-nosed moles, luminescent sea life and other creatures that work on nature's night shift in this interactive exhibit. Activities will continue through the wee hours with exhibit tours, music, the Chocoholic Buffet and a grade-B film extravaganza, the "Natural Horror Picture Show." (Not for the easily queasy)

N.C. MUSEUM OF NATURAL SCIENCES

***School children from across the state will soon be** getting acquainted with the new Museum of Natural Sciences, located in downtown Raleigh. The museum will officially open April 7.*

As dawn breaks on April 8, early birds will be served breakfast to the tune of Dixieland jazz. Performances especially for children are the focus for the "Kid's Trek" Saturday morning. Emmy-award-winning environmental magician Dr. Wilderness and the inimical Banana Slugs String Band headline. Activities, performances and building tours continue all day. Events will wind up with closing ceremonies from 4 to 5 p.m.

Free, guided tours of the four floors of new exhibits will be offered both days of the event. Kids of all ages will want to see the unique Terror of the South exhibit, showcasing the fossilized skeleton of the world's only *Acrocanthosaurus* dinosaur.

In the Mountains to the Sea exhibit, visitors can walk through five North Carolina habitats, from a high-altitude spruce-fir forest to a bottomland swamp. Live animals such as snapping turtles, salamanders, snakes and fish live in exhibits, bringing wildlife close enough to touch. The Tropical Connection exhibit demonstrates North Carolina's connections to the rest of the world. In the Living Conservatory, live hummingbirds and butterflies inhabit a lush tropical forest.

When the new Museum of Natural Sciences opens in April, the grand opening celebrations won't be limited to downtown Raleigh. More than 100 field trips have been assembled through the Museum's "Afield But Not Afar" program, designed to showcase the wildlife and wild places of North Carolina from the Blue Ridge to the beach. Field trips are as short as two-hour bird hikes, or as adventurous as three-day backpacking, canoeing and sea kayaking trips. For more information and a schedule of "Afield But Not Afar" programs, call (919) 783-1118.

"For people who cannot attend the '24-hour Trek,' getting outdoors is the best way to participate in the celebration," Bennett said. "Our hope is that people will be inspired by what they see, both in the museum and in the wild, and deepen their commitment to caring for our diverse natural treasures."

The museum is recruiting volunteers both for the grand opening and for continuing opportunities in the new museum. For details on opening events or to volunteer, call (919) 733-7450, or check the museum's website: http://www.naturalsciences.org.

—Courtesy of N.C. Museum of Natural Sciences

Land Ethic

Dear Wildlife:

I am writing to you in response to your September article about Aldo Leopold. While I read the article concerning a topic as well as a literary work that are key in my own life, I reflect on the future of my newly purchased land. Land management will be a part of the rest of my life and *A Sand County Almanac* is a book I will continue to reread many times as I have done since discovering it 10 years ago.

To give you a brief background of myself, I am a North Carolinian by birth, a mountain dweller by choice, a wildlifer by degree, and an outdoorsman by good fortune. I have been a *Wildlife in North Carolina* reader since my preteens.

What I really want to say is simply thank you for the article on a work that I think should be an integral part of any sportsman's working vocabulary whether they are land owners or not.

—Phil Price, Brevard, N.C.

Help Wildlife at Tax Time

The time for filing 1999 income tax returns is just around the corner. When you file this year, consider donating to the North Carolina Nongame and Endangered Wildlife Fund by checking the appropriate blank on your state tax form. These funds are critical for preserving the state's rare, endangered and threatened wildlife species.

Some of the Nongame Program's better-known projects include sea turtle monitoring, peregrine falcon restoration, bald eagle research, flying squirrel studies and colonial waterbird nesting-protection projects. The Nongame Program has been vital in researching rare bats as well as mollusks, crayfish and fish species. The program has also taken the role as lead agency in North Carolina Partners In Flight—an international effort to stop the decline of migrating songbird populations.

But the checkoff contributions still provide the major financial support for the projects. "The Nongame Program still needs the continued support of the people of North Carolina to continue what we have been able to build in the program's history," said Randy Wilson, section manager of the Wildlife Commission's Nongame and Endangered Wildlife Program.

Make your tax-deductible donation through the income tax checkoff or directly to the Nongame and Endangered Wildlife Fund, N.C. Wildlife Resources Commission, 1724 Mail Service Center, Raleigh, N.C. 27699-1724.

NORTH CAROLINA NONGAME & ENDANGERED WILDLIFE FUND

Conservation Easement Booklets on Sale

Many landowners want to save the natural and rural character of their property, but the present tax structure often makes this a difficult or financially impossible task. One of the best ways available to protect land is through conservation easements. These agreements permanently restrict potential land uses that might damage significant environmental and historic resources. Easements provide landowners with assurance that their property will be permanently protected and their income taxes, estate taxes and, often, property taxes reduced.

The Conservation Trust of North Carolina—a private nonprofit organization that is helping communities and private landowners protect important natural and rural lands—has completed several publications explaining the use of easement agreements for land conservation and historic preservation purposes.

The two guides help explain conservation easements and their advantages for private landowners. The first is a simple 16-page "Conservation Easement Introduction" pamphlet, and the second is a more detailed 38-page guidebook titled "Conservation and Historic Preservation Easements." Costs are $1.75 for the "Easement Introduction" and $6.50 for the "Easements" guidebook (mailing costs and sales tax included). Discounts are available for orders of multiple copies by conservation organizations and public resource agencies.

For more information or to order, contact The Conservation Trust of North Carolina, P.O. Box 33333, Raleigh, N.C. 27636, (919) 828-4199.

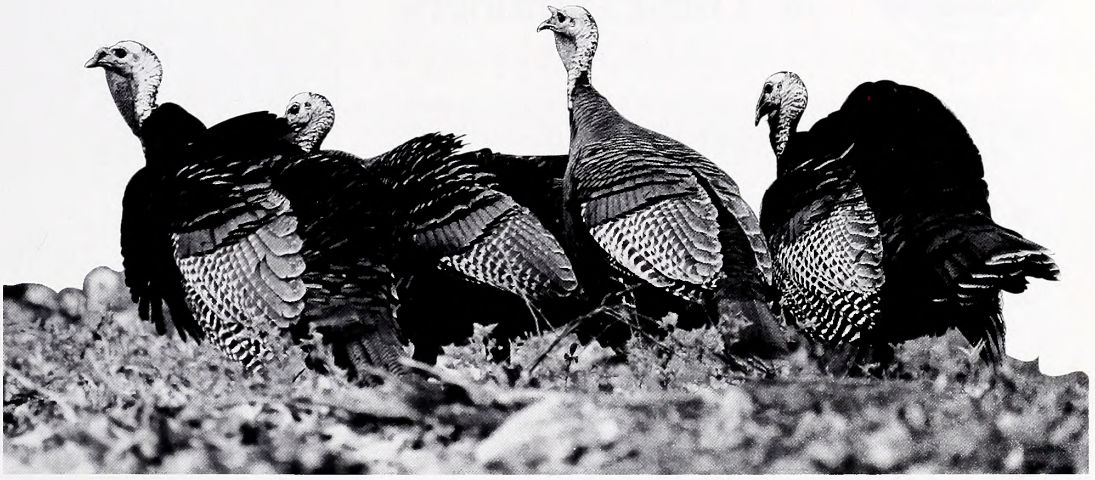
Field Notes

Wild Turkey (bearded birds only)	April 8-May 6
Hatchery-Supported Trout Waters	Opens April 1
Wild Trout Waters	Year-Round
WATERFOWL	
Snow and Blue geese	Through March 10

Information on bag limits and other regulations may be found in the *1999-00 North Carolina Inland Fishing, Hunting & Trapping Regulations Digest*. For a copy, check with license agents or contact the N.C. Wildlife Resources Commission at (919) 733-7291. **For more information on waterfowl regulations and limits, call 1-800-675-0263.**

North Carolina Outdoor Calendar of Events

On several occasions, events in this calendar have been changed without notice. Readers should check with the contact listed before traveling to an event. Items for listing should be conservation oriented and should be sent at least four months in advance.



LEONARD LEE RUE, III

March 11

The Pisgah Center for Wildlife Education, located near Brevard, will conduct the Talk'n Turkey program from 9 a.m. to noon. Designed for participants ages 12 and older, this program provides tips for hunting wild turkeys. Experienced hunters will discuss calling, use of camouflage, hunting strategies and safety. For more information, call (828) 877-4423.

March 15

The N.C. Partners in Flight annual meeting will be held 9 a.m. to 12:30 p.m. at Blue Jay Point County Park in Wake County nears Falls Lake. The theme of the meeting will be the "Power of Partnerships: Better Bird Conservation for North Carolina." The meeting will include a number of experts highly involved with migratory bird conservation.

March 18

The 5th Annual Wildlife Action Wildgame Cook-off will be held at the Boys and Girls Home Exhibition Center at Lake Waccamaw. Plaques and cash prizes will be awarded to the winning cook in the categories of fur, fin and fowl. There is a $25 cook entry fee, and all meals must be prepared on site to be judged. In addition, there will also be fun activities for the kids, live entertainment and much more. Revenues derived from the cookoff will be used by the Wildlife Action Inc. chapters to fund programs such as Take a Kid Fishing Days and hunter safety courses. For more information, call Allison Greene at (910) 646-6458.

March 21

The Pisgah Center for Wildlife Education, located near Brevard, will conduct the Fishy Facts program from 4 to 5 p.m. Designed for participants ages 10 and up, this program focuses on fish, including their color, how and what they eat, how and why they grow scales, and how they breathe. For more information, call (828) 877-4423.

March 24-26, April 28-30

The N.C. Wildlife Resources Commission will host a Beyond BOW-Hunter Education Weekend at Camp Millstone, in Ellerbe. Beyond BOW is designed to introduce women ages 18 and up to outdoor skills. Participants will receive their hunter safety certification upon completion of this workshop. Also, a Becoming an Outdoors-Woman Workshop will be held on April 28-30, 2000. It will be at Camp Cherrio, in Glade Valley near Stone Mountain State Park. For more information regarding both workshops, call (919) 733-7123 for registration materials.

On Patrol

Editor's note: Listed below is an account of a situation that exemplifies the always unpredictable nature of a North Carolina wildlife enforcement officer's job.

Area Sgt. Paul Linder and canine officer Niko recently assisted in the search for an elderly hunter lost for 32 hours in the Holly Shelter Game Land. A hard rain had fallen, which had considerably hampered rescue efforts. At 1 a.m. the hunter was located in a thick, wooded area. However, efforts to reach the man by officer Linder and his dog were extremely difficult due to the thick terrain and high water. At one point, Linder stepped through a wet area and sank up to his neck in muck and water. Unable to free himself and sinking deeper, Linder gripped the leash on his dog and gave Niko the "Get Him" command. Obeying the order, the powerful German shepherd lunged forward, pulling Officer Linder from his desperate situation. Once Linder was free, he immediately gave Niko the stand-down command. A National Guard helicopter was called in, and the hunter was later treated and released by a waiting medical team. (Officer Linder probably has a whole new understanding of the meaning of "man's best friend.")

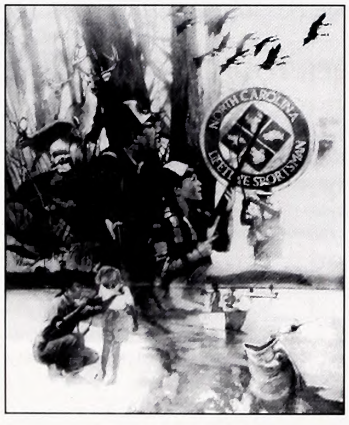
Catch Us at These Numbers

- **1-800-662-7137** to report violations of hunting and fishing laws.
- **1-800-628-3773** (NC VESSEL) for boat registration and titling.
- **1-800-675-0263** for hunting dates and shooting hours for migratory game birds.
- **1-888-248-6834** (2HUNTFISH) to purchase most licenses with VISA or MasterCard using a touch-tone telephone.
- **1-800-446-8663** (I GOT ONE) to report big game harvests.
- Connect to the Commission's online web site at **http://www.state.nc.us/Wildlife/**

The N.C. Wildlife Resources Commission maintains five toll-free telephone numbers to provide better services and convenient access to information for North Carolina citizens. Calls are answered in order, but some numbers may require a wait during busy seasons.

VISA MasterCard

Wildlife Endowment Fund Report



Totals Through December 1999

Principal Balance
$29,082,244.55

Interest Earned
$29,933,802.15

Total Receipts
$59,016,046.70

Interest Used
$18,100,819.04

Fund Balance
$40,915,227.66

Established on May 29, 1981, this fund is derived from the sale of lifetime hunting and fishing licenses and lifetime subscriptions to *Wildlife in North Carolina* magazine as well as from tax deductible contributions. While the interest may be used to supplement N.C. Wildlife Resources Commission programs, the principal remains invested to generate additional interest for the future.

Tax Credits for Wildlife

by Rodney Foushee

Looking for a way to save on taxes and help fish and wildlife on your land? Consider North Carolina's Conservation Tax Credit program.

This flexible program provides a state tax incentive to protect the environment through donations or conservation easements on private land. And as long as a donation or easement protects fish and wildlife habitat, enhances water quality, preserves the landscape or provides public access, it will likely qualify for the credit. This could include donations of river buffers or easements on private hunting lands.

Since its inception in 1983, more than 52,000 acres of land have been protected for conservation in North Carolina thanks to the incentive of the tax credit. Unlike tax deductions, tax credits can be subtracted directly from state taxes owed. In North Carolina, the Conservation Tax Credit is 25 percent of the value of the property or conservation easement. And the state has generous limits on the tax credit. Currently, the limit is $250,000 for individuals and $500,000 for corporations. Any excess tax credit can also be carried over and used for five additional years.

To qualify for the Conservation Tax Credit, you must voluntarily transfer some or all of the rights associated with a tract to a government agency, including the Wildlife Resources Commission, or to a nonprofit group such as a local land trust. This may include an outright donation of the land or the placement of a conservation easement on the property, which restricts future development of the land. A third option is a donation of remainder interest, which allows you to continue to live on the property for the rest of your life then the property is transferred to the nonprofit group or government agency.

Landowners who donate a conservation easement may also benefit from lower property taxes as well as lower capital gains and estate taxes. You may also claim a federal income tax deduction on the easement as a charitable contribution.

All applications for certification of the state Conservation Tax Credit must be made with the N.C. Department of Environment and Natural Resources. For more information about the tax credit program, contact Bill Flournoy at (919) 715-4191.

N.C. WILD STORE

RARE HABITATS

water-quality issues

Indian remains

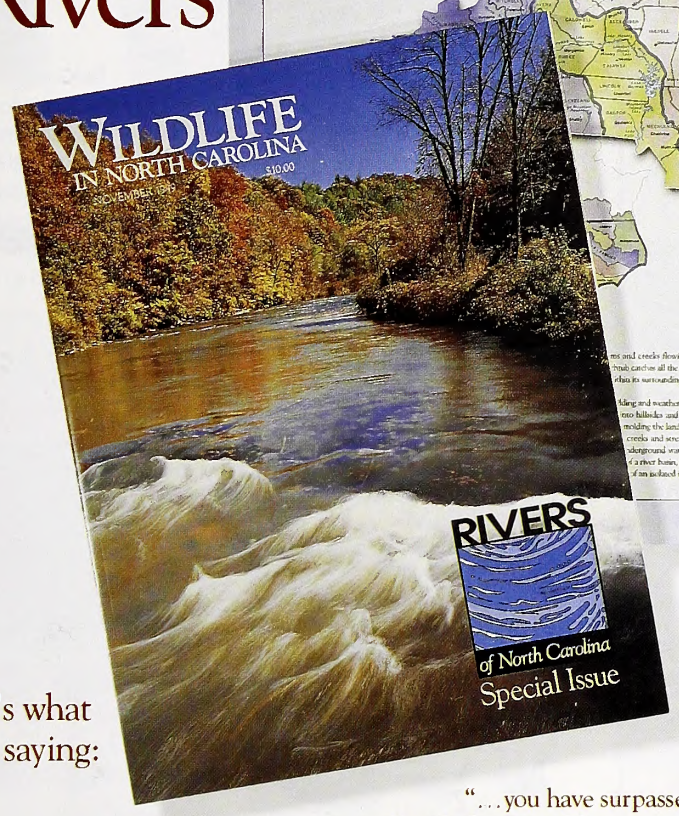
early explorers

the secret life of animals

canoe trips

the real-life stories of people working to clean our rivers

A Time *for* Rivers



Here's what they're saying:

"...you have surpassed yourself with this issue. The art is not just beautiful but illustrative and informative; the photos and charts and sketches of the river basins are put together with a wonderful sense of composition to enhance the articles. ["Rivers of North Carolina"] is a classic."
—Philip Gerard, author of *Cape Fear Rising*

"With excellent writing, photos, and maps, the [special issue] is a beautiful gift to all of us, as well as a wonderful teaching tool for all ages. What a great way to bring in the Year of the Rivers - 2000 celebration!"
—Peg Jones, executive director, North Carolina Watershed Coalition

You'll experience all of these and much more in "The Rivers of North Carolina," a 128-page special issue of *Wildlife in North Carolina*. For timely coverage of all of North Carolina's river basins, as well as eye-catching photos and educational maps and graphics, there's nothing else like it on bookshelves anywhere.

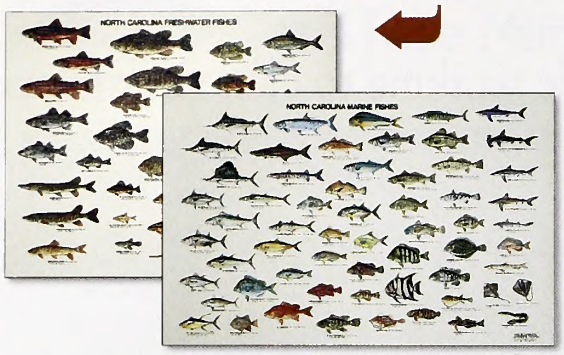
Order "Rivers of North Carolina" today for your own bookshelf, or give it to friends and family members to enjoy. For $10, plus shipping and postage, you'll have a coffee-table edition that's already being hailed as a classic.

Item Code M11 $10

All proceeds from the sale of these products support the development and production of conservation education projects and programs.

N.C. WILD STORE

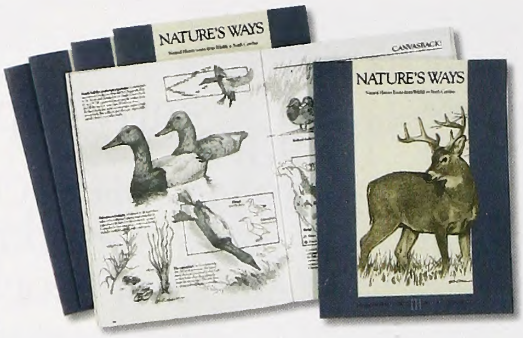
North Carolina's freshwater fish and marine fish are colorfully displayed on individual posters, and feature the art of Duane Raver. Reel yours in today!



Fishes of North Carolina

Set of 2. Freshwater fish poster shows 36 state species (size 28" x 22½"). Marine fish poster shows 60 species (size 35" x 22½") $10.

ITEM CODE **P9**



Nature's Ways Collection

Explore the wonders of the natural world, wildlife species and ecosystems through "Nature's Ways." More than 200 essays from *Wildlife in North Carolina* have been compiled in a beautiful 6-volume paperback set. $27.50.

ITEM CODE **M9**

Also available as a boxed set. $30.

ITEM CODE **M10**

Before going on your next outdoor hike or camping trip, be sure you know North Carolina's reptiles.

Reptiles of North Carolina

Set of 4 posters in full color. Each poster decribes the species and denotes which reptiles are on the endangered, protected or special concern list. A set includes: lizards, turtles, and both live-bearing snakes and egg-laying snakes. Posters are sized 22" x 34". $18. ITEM CODE **P10**

Amphibians of North Carolina

The Hylid Frogs. North Carolina's tree frogs, cricket frogs and chorus frogs, belonging to the large family *Hylidae*, are presented in this colorful poster, one of two frog posters in the Amphibians series. 22" x 34". $6.

ITEM CODE **P11**

Amphibians of North Carolina

True Frogs and Toads. The second poster in the Amphibians series showcases true frogs and toads. Vibrant photos combine with informative text to make it a standout in the classroom or at home. 22" x 34". $6.

ITEM CODE **P14**

Waterfowl Decoys of N.C.

Nineteen classic waterfowl decoys from North Carolina's legendary days of waterfowl hunting have been collected for the first time on this framable, high-quality poster. This is the first in a series of "Sporting Heritage" posters. 22" x 34". $10.

ITEM CODE **P12**

Traditional Trout Flies of the Southern Appalachians

Sixteen traditional trout flies are presented in stunning color detail. Each fly is accompanied by a brief history of its development and use in Appalachian waters as well as the components that make up each hand-tied creation. Second in a series of "Sporting Heritage" posters. 22" x 34". $10. ITEM CODE **P13**

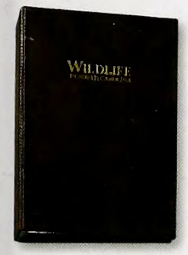
Bird Houses & Feeders: How to Build and Enjoy Them

An eight-page illustrated guide to building bird houses and feeders. $2.

ITEM CODE **M6**

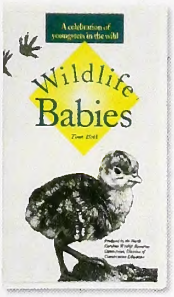
Dogs that Point, Fish that Bite

Here are 50 of the best "Our Natural Heritage" columns written by Jim Dean for *Wildlife in North Carolina* over the past 17 years. Published by the University of North Carolina Press and the N.C. Wildlife Resources Commission. Hardbound. 220 pages. **$19.95.** ITEM CODE **M8**



Magazine Binder

Store 12 issues of *Wildlife in North Carolina* in a sturdy binder. **$10.**
ITEM CODE **M2**



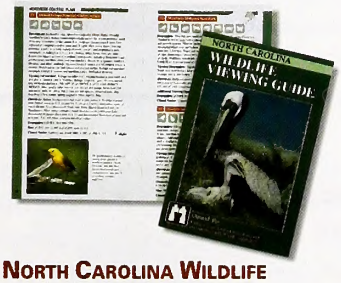
Wildlife Babies Video

Entertaining 25-minute video version of the classic 1965 Jack Dermid film reveals springtime antics of young wood ducks, black bear, possums, cottontails and others . **$20.**
ITEM CODE **N9**

Based on Chief Seattle's 1855 speech, the film's focus on environmental ethics. Accompanied by This Land Is Sacred, this film is a must-see for everyone. It is destined to become a classic.

All Things Are Connected

Video and Activity Guide. **$22.**
ITEM CODE **W3**



North Carolina Wildlife Viewing Guide

From Cape Hatteras to the Great Smokies, *North Carolina Wildlife Viewing Guide* will lead you to 90 of the state's premier wildlife viewing locations—and better your chances of seeing wildlife once you get there. **$5.95.** ITEM CODE **N6**

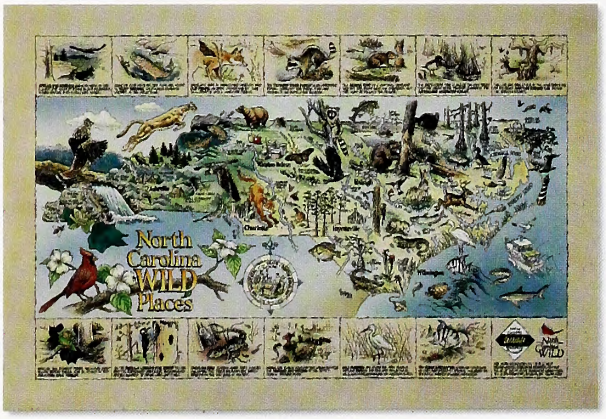
Gardens for Butterflies

Article reprint from *Wildlife in North Carolina* magazine for the gardener who wants to attract some of nature's most colorful creatures. **$2.** ITEM CODE **M5**

Scouting Correlations

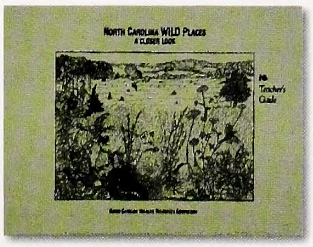
Cub, Boy and Girl Scout requirements are correlated to Project WILD and Aquatic WILD activities. Supplements Scout leaders' planning materials and events. Each **$3.**
Cub & Boy Scout Correlation. ITEM CODE **E9**
Girl Scout Correlation. ITEM CODE **E10**

North Carolina's wildlife habitats come alive in this 82-page, easy-to-read, soft cover book. With delightful illustrations by Anne Marshall Runyon, N.C. WILD Places covers 13 habitats across the state.



North Carolina WILD Places: A Closer Look

Book and Posters Set. With each book you'll receive two habitat posters (also by Runyon) and a N.C. WILD Places Map poster, featuring the art of Jackie Pittman. **$16.** ITEM CODE **E6**



North Carolina WILD Places Teacher's Guide

For teachers using *North Carolina WILD Places* in the classroom, these activities and games will heighten student awareness of wildlife habitats. **$6.**
ITEM CODE **E7**

More terrific items ☛

N.C. WILD STORE

Top-quality, 3-ring binder holds 120 WILDlife Profiles. Custom-made binder comes with a table of contents, tab dividers to organize Profiles by classes, an index and 120 fact sheets.

WILDLIFE PROFILES BINDER & WILDLIFE PROFILES SETS 1-12

Binder features clear overlay cover, 1 1/2" capacity and inside literature pockets. See the list of species profiled below. $30. ITEM CODE **W17**

Set 1. Black bear, raccoon, white-tailed deer, striped skunk, bobwhite quail, wild boar, muskrat, mourning dove, coyote, mallard.

Set 2. Mink, canvasback duck, red fox, wild turkey, beaver, American river otter, Canada goose, bobcat, red wolf, cougar.

Set 3. Humpback whale, black duck, osprey, clapper rail, red-shouldered hawk, cottonmouth, diamondback terrapin, largemouth bass, black crappie, channel bass.

Set 4. Brook trout, garden spider, Tar spiny mussel, wood duck, bullfrog, mayfly, tiger salamander, bog turtle, hellbender, shortnose sturgeon.

Set 5. Cottontail rabbit, gray squirrel, northern flying squirrel, newt, common crow, red-tailed hawk, prothonotary warbler, bluegill, striped bass, Eastern oyster.

Set 6. Opossum, peregrine falcon, Eastern bluebird, American toad, rat snake, Eastern glass lizard, smallmouth bass, brown trout, monarch butterfly, Virginia big-eared bat.

Set 7. Chipmunk, gray fox, bald eagle, loggerhead shrike, common snapping turtle, five-lined skink, bluefish, rainbow trout, grasshopper, horseshoe crab.

Set 8. Appalachian cottontail, manatee, barred owl, turkey vulture, Neuse River waterdog, spring peeper, coral snake, American alligator, American eel, American shad.

Set 9. Southern flying squirrel, fox squirrel, great horned owl, snowy egret, Southern leopard frog, corn snake, Atlantic sturgeon, walleye, luna moth, crayfish.

Set 10. Marsh rabbit, woodchuck, hooded warbler, whippoorwill, green salamander, copperhead, fence lizard, muskellunge, chain pickerel, Scotch bonnet.

Set 11. Atlantic croaker, Southern flounder, summer flounder, spot, king mackerel, Spanish mackerel, sea mullet, weakfish, spotted seatrout, striped mullet.

Set 12. Bay scallop, black sea bass, blue crab, brown shrimp, spiny dogfish and smooth dogfish, gag, hard clam, menhaden, sandbar shark, white perch.

EMBROIDERED CAPS

North Carolina WILD Cap. N.C. Wild cardinal on brushed-cotton twill cap with a Velcro® closure. Two-tone cap is tan/forest green. $16.50. ITEM CODE **A1**

Wildlife in North Carolina Caps. Exclusive designs and magazine logo are featured on three different cap styles. $16.50 each.

- Brook trout on sage-colored, brushed cotton cap with an unstructured front, extended bill, and nubuck suede closure. ITEM CODE **A3**
- Deer silhouette on Advantage® Camouflage cotton cap with tan suede bill. ITEM CODE **A6**
- Deer silhouette on blaze orange cap with brown waxcloth bill. ITEM CODE **A7**

PISGAH CENTER FOR WILDLIFE EDUCATION T-SHIRT

100% cotton natural color tee with design on back and Pisgah logo on front. $14.50.
ITEM CODES:
A8MED (medium)
A8LRG (large)
A8XLG (extra large)
A8XXL (extra extra large)

NEW: WEE TEES

Just like the adult shirt with Pisgah design, only smaller.
ITEM CODES:
A9XS (extra small; size 2-4) $10.
A9SM (small; size 6-8) $12.50.
A9MD (medium; size 10-12) $12.50.
A9LG (large; size 14-16) $12.50.

WHILE SUPPLIES LAST!

WILDLIFE IN N.C. T-SHIRT

WINC magazine logo on front pocket. Tundra swan art on back. White. $14.50. ITEM CODES:
A5MED (medium)
A5LRG (large)
A5XLG (extra large)
A5XXL (extra extra large)

N.C. WILD T-SHIRT

N.C. WILD logo printed on front and colorful art on back. White. $14.50. ITEM CODES:
A4MED (medium)
A4LRG (large)
A4XLG (extra large)
A4XXL (extra extra large)

WILDLIFE COMMISSION SPOTLIGHT

Focus on Birds

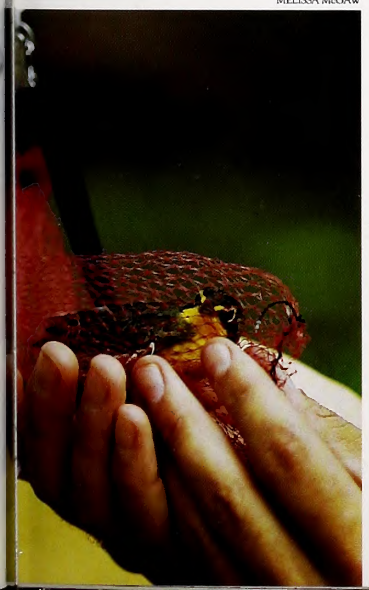
Bird conservation is "taking flight" in North Carolina thanks to the Nongame and Endangered Wildlife Program. Through the efforts of biologists working for the N. C. Wildlife Resources Commission, many types of birds and their habitats are receiving needed attention.

Partners in Flight: Through the Partners in Flight Program, nongame biologists are educating North Carolina citizens about migratory birds all year long. Bird identification training workshops are being offered for biologists, foresters and natural resource managers to expand bird-monitoring programs in the state, including the Breeding Bird Survey. And the Partners in Flight coordinator is helping to write bird conservation plans for all regions of the state to direct research, conservation and management of migratory birds.

Vital Research: Biologists working for the Nongame Program are involved in vital research projects throughout North Carolina. Some work at stations where they net and band birds, then release them after taking various measurements that will help biologists better understand how long the birds live and how many young they produce. Nongame biologists also conduct bird surveys throughout North Carolina, counting birds to gather data to better manage and conserve species, from the commonplace to the rare and unusual.

***Biologists working** for the Nongame Program capture and band songbirds across the state, taking various measurements (below) before releasing them.*

MELISSA McGAW



Bird Conservation: Nongame biologists help conserve the federally endangered red-cockaded woodpecker, and their efforts have led to the removal of the brown pelican from the state's Threatened and Endangered List. They have reintroduced the peregrine falcon in the mountains and have monitored nesting of this species for over a decade. They also track the number of bald eagle nests throughout the state. Through education, conservation, research and management activities, the Nongame and Endangered Wildlife Program is involved in countless ventures that further bird conservation throughout North Carolina.

KEN TAYLOR

***Wildlife Commission** personnel help endangered red cockaded woodpeckers by installing artificial nesting cavities in pine trees (above) in which the birds can raise their young.*

Return the Gift: To help support research, education and management activities that conserve migratory birds, consider a tax-deductible donation to the Nongame and Endangered Wildlife Fund. Make your contribution through the check off on your state income tax form, or give directly to: Nongame and Endangered Wildlife Fund, N.C. Wildlife Resources Commission, 1724 Mail Service Center, Raleigh, N.C. 27699-1724.

NORTH CAROLINA NONGAME & ENDANGERED WILDLIFE FUND

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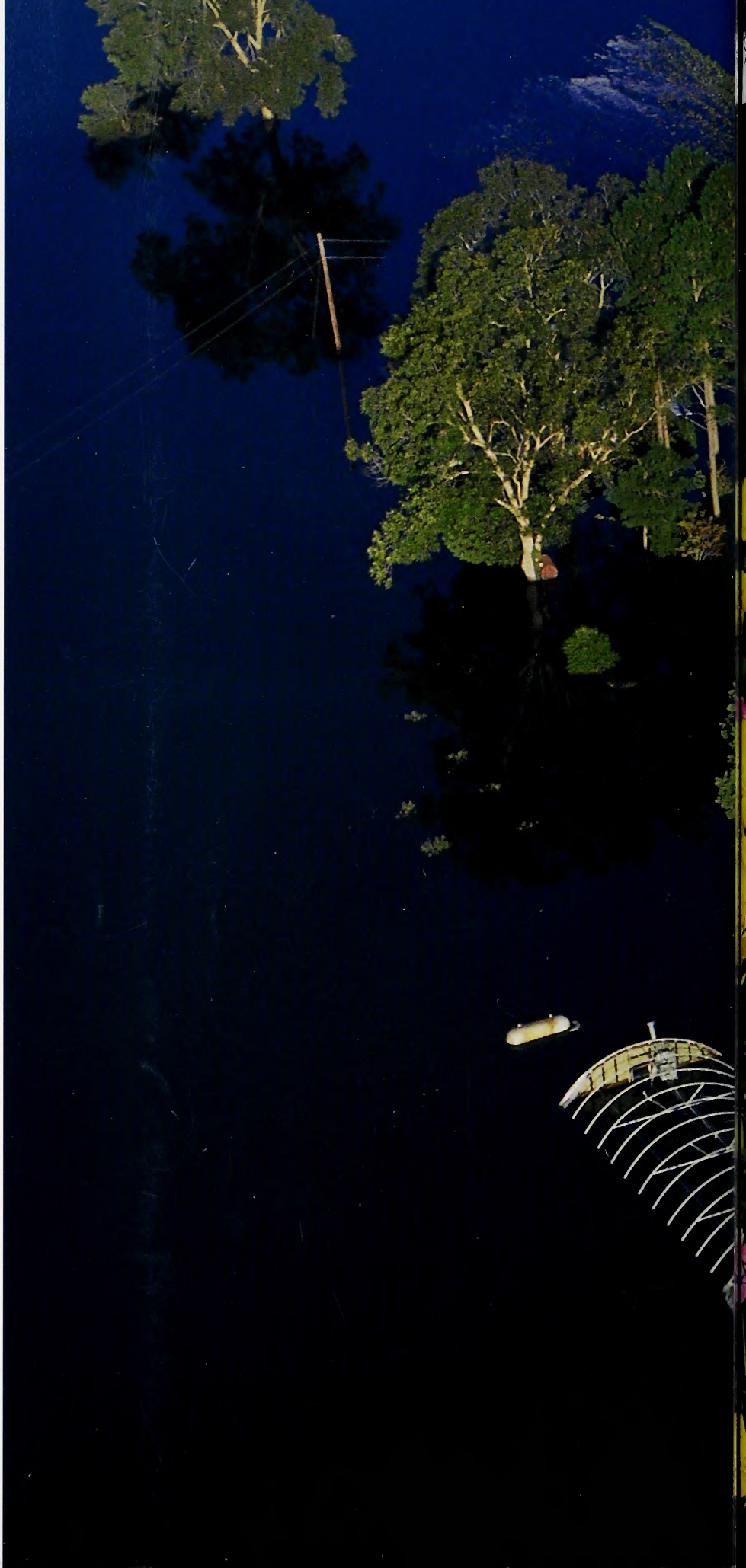

Hurricane Warning

Bathed in the warm sunlight that always seems to follow major storms, this flooded farmstead in eastern North Carolina testifies to the effects of back-to-back hurricanes in September 1999.

Periodicals postage paid at
Hickory, North Carolina

LITHOGRAPHY BY THE HICKORY PRINTING GROUP,
CONOVER, NORTH CAROLINA

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7:64/4

WILDLIFE IN NORTH CAROLINA

APRIL 2000 $1.50

The Angle of Disrespect

by Jim Dean ©2000

Maybe it's just my impression, but does it seem that we are in a growth market for stereotypes? "Well, if there weren't any stereotypes, there might not be any types at all," one friend surmised. Could be. Nowadays, anything that's the least bit unfamilar to us is very apt to get labeled. The problem is that it's almost invariably in an unflattering way. Nothing seems immune—cultures, customs, politics, tastes, habits, even hobbies. It's almost as though we'd rather accept the stereotype than learn the truth about anything the least bit foreign to us.

JIM DEAN

Take the stereotypical view of fishermen. We're so lazy that all we do is sit in the sun and watch a cork, and we're so obsessed with this simple pursuit that we can never hope to amount to anything worthwhile. Or we're retired with nothing better to do than await the grim reaper. Oh yes, we also tell huge lies. To be sure, it's hardly anything to get worked up about, but it's still mildly annoying.

In recent months, *The Wall Street Journal* has been running an advertisement on television that compares two kids—one who grows up reading fishing magazines (and winds up in a dead-end career living with his parents) while the other reads the *Journal* and makes a fortune. It's popular horse manure. Considering the kind of money being made these days in the recreational fishing market, there are myriad moguls who could buy the *Journal* and still have enough pocket change left over to acquire a 50-foot sportfisherman.

Here's another example. Jimmy Johnson retired last winter at the age of 56 from what had been a somewhat disappointing career as head coach of the Miami Dolphins, although he had previously enjoyed great success in the same position at the University of Miami and subsequently with the Dallas Cowboys. Johnson understandably wanted to take a break, spend some time with his family and assess what he might want to do next. "Jimmy Johnson does not want a contract or job," said his former boss Wayne Huizenga. "He doesn't want any day-to-day position. He wants to fish." Yet to hear the reaction of some pundits, they clearly believed that this highly successful man was going to waste the rest of his life angling.

"Contrary to popular belief, fishing is not for the lazy—it absorbs vast amounts of energy—and it is also infinitely challenging."

Sure, fishing for fun is only a pastime for most of us—like golf, skiing or sailing—but even the most dedicated workaholics learn that productivity is enhanced by intervals of leisure. And if you don't think fishing is important except as a diversion from work, perhaps that's only a question of perspective. John Voelker—a judge who wrote *Anatomy of a Murder* and also several highly successful books on fishing—put it better than most when he observed that "it's not because I regard fishing as being so terribly important, but because I suspect that so many of the other concerns of men are equally unimportant—and not nearly so much fun."

Many years ago when he was a young man, one of my friends decided that life was too uncertain and short to spend all of it working in traditional forms of employment. He moved to Florida and worked for awhile as caretaker of an expensive yacht. "Ya know, Bob," the boat owner told him. "You're a bright fellow, college eduated. You could do well if you'd just apply yourself." Bob's answer was, I think, a good one. "You work in a big city for 50 weeks a year in order to make enough money to afford this boat, and you get to spend at best two weeks a year on it," replied Bob. "Meanwhile, you pay me well to live on your boat the rest of the year and fish whenever I want to. Who do you think has the better deal?"

Contrary to popular belief, fishing is not for the lazy—it absorbs vast amounts of energy—and it is also infinitely challenging. There isn't the remotest chance you will learn all the skills you need even if you spend the better part of your life trying. And, equally wonderful, it generates an unlimited need for new toys.

One suspects that Jimmy Johnson already knows all this but, if not, he's in for a surprise. Trying to take the Dolphins to a Super Bowl may well be a piece of cake compared to putting together the knowledge and gear necessary to land one 10-pound bonefish on a fly. As for the editors of *The Wall Street Journal*, I'd suggest they might profit from a day or two fishing a Montana trout stream, except that the streams are already overly crowded because so many well-heeled adults have grown up reading fishing magazines instead of the *Journal*.

One more thing. What's this stuff about fishermen telling lies?

Contents

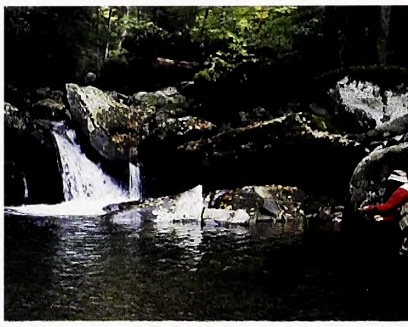
Wildlife in North Carolina

Wildlife in North Carolina is the official educational publication of the North Carolina Wildlife Resources Commission. It is dedicated to the sound conservation of North Carolina's wildlife and other interrelated natural resources and also to the environment we share with them.

April 2000 *Volume 64, Number 4*

Features

4 **Tiny Trophies of the Smokies** *by H. Lea Lawrence* ©2000
Brook trout may not be big, but these speckled beauties offer fine sport for those willing to explore our high-mountain streams.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8 **The Ultimate Big-Game Challenge**
written and photographed by Mike Gaddis ©2000
Think you've done it all? Hunting a long-beard with a bow will test you like nothing else.

12 **Little Foxes** *photographed by Ken Taylor*
Just a few months old, a litter of fox pups emerges from its sandy den to explore the wonders of a bright, new world.

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written by Carol Marsh ©2000
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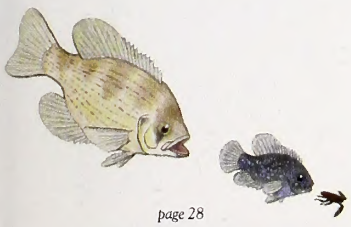
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Cover *This group of sun-loving native wildflowers sizzles in the sunny section of the garden. Photograph by Melissa McGaw.*

Wildlife in North Carolina (ISSN 0043-549X) is published monthly by the North Carolina Wildlife Resources Commission, 512 N. Salisbury St., Raleigh, N.C. 27604-1188. Periodicals postage paid at Raleigh, N.C. and additional mailing offices. Subscription rates: one year $7.50, three years $20, lifetime $100. All foreign subscriptions are $23.50 per year. For subscriptions from foreign countries, payment **only** by U S Postal Service money order or cashier's check drawn on a U.S. bank. All orders must be prepaid. Please allow 6 to 8 weeks delivery on new subscriptions and address changes. **POSTMASTER:** Send address changes to Circulation Manager, 1711 Mail Service Center, Raleigh, N.C. 27699-1711. Address all correspondence regarding subscriptions to Circulation Manager. If you have a problem with your subscription, dial (919) 662-4377. Articles in *Wildlife in North Carolina* may represent the personal views of authors, and do not imply endorsement by the North Carolina Wildlife Resources Commission. *Wildlife in North Carolina* is available on audio cassette as a courtesy of volunteer services of the Department of Cultural Resources, Library for the Blind and Physically Handicapped, Raleigh, N.C., (919) 733-4376. **The N.C. Wildlife Resources Commission is an equal opportunity agency.**

Sensing the Waters

written by Terry Krauthurst ©2000
illustrated by David Williams

Have you stood barefoot in a pond or tide pool, and had minnows come nibbling at your toes? Those fish were not driven by a fondness for feet, but by their senses of smell and taste, stimulated by traces of organic compounds—in this case, amino acid molecules washed from your skin.

In the watery world of fish, where vision generally is limited, the senses of smell (olfaction) and taste (gustation) speak volumes. Fish are able to detect extremely minute amounts of organic substances in water—less than one part per billion, in some instances. And except for the occasional case of a wading human to confuse matters, the information is invariably useful.

Amino acids, for example, often are a sign of food nearby. All living things produce and give off amino acids—they're the building blocks of protein. And because in water they're fleeting—soon consumed by bacteria and algae—their presence means something alive or just-dead is in the vicinity.

All sorts of tales are told, in fact, by waterborne amino acids and other components of the excretions and secretions of aquatic plants and animals—the stuff of which, for fish, most smells and tastes are made. They can reveal the presence of predator and prey, serve as signposts to habitat and home, identify kin and school mates, and more.

But how do fish, constantly awash in information soup, distinguish individual smells and tastes?

Like most animals, fish are equipped with chemo receptors—specialized cells in taste buds and nasal tissue that sense chemical stimuli and relay the information as electrical impulses to the brain. Each receptor cell is a specialist, able to bind with, and thus detect, only chemicals of the right "fit" or molecular makeup. Different receptors sense different chemicals.

So as water passes over a fish's taste buds and through its nasal openings, its receptor cells essentially sort liquid-borne information. Some molecules may bind to compatible chemo receptors in nasal tissue, others to chemo receptors in taste buds.

All the data ultimately pass to the brain, but to different areas—thus provoking different behaviors—and by way of different conduits.

Smell receptors, for example, are single nerve cells individually hard-wired to the olfactory bulb, a sort of relay station for brain-bound odor information. There, incoming signals from some 5 to 10 million smell receptors are organized and routed via bundles of nerve fibers to the fish's forebrain, an area associated with—among other things—memory and behavior (sexual, social, and learned). Fish respond to some odors instinctually, and learn over time to recognize others.

Taste receptors, on the other hand, number from 30 to 100 per taste bud. Each is wired to one or more nerve fibers—which in turn may be "cross wired" to a multitude of other receptors, not necessarily within the same bud. Nerves connecting tens of thousands of taste receptors lead to the fish's hindbrain, which relays information to centers associated with basic functions such as reflexes. Snapping or biting at tasty stimuli is an automatic reflex in most fish.

Of course, not all fish are equally sensitive to specific smells or tastes, and not all smells and tastes provoke the same actions.

Those toe-nibbling minnows, for instance, are among fish who react with unrestrained gusto to numerous amino acid types. Salmonids, on the other hand, have a much pickier palate—ask any trout angler.

Not all fish are equally equipped, either. Trout are among the majority of fish that use primarily sight and smell to locate food, and taste only to sample and accept or reject it. Their taste buds number around 5,000 and are located in and around their mouths and gill arches.

Other fish possess a higher-powered taste system capable not only of sampling but of finding food at distance even in murky water. Catfish, virtual "swimming tongues," are covered stem to stern with taste buds, as is clearly seen in the illustration at right.

One thing is certain: The slippery liquid in which a fish swims is hardly water alone, especially to the fish. The currents carry a continuous stream of information, of tell-tale smells and tastes vital to survival.

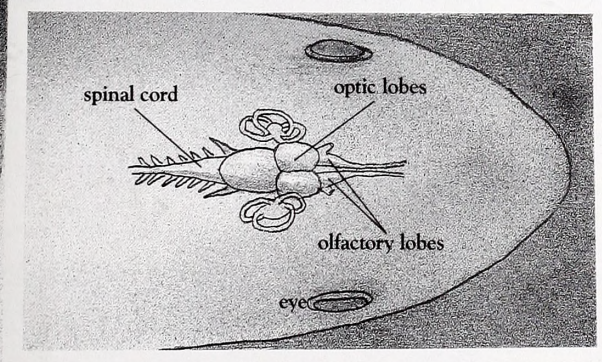
Other Reading

- Rhode, Fred C., *Freshwater Fishes of the Carolinas, Virginia, Maryland, & Delaware* (University of North Carolina Press, 1996).
- Smith, C. Lavett, *Fish Watching: An Outdoor Guide to Freshwater Fishes* (Cornell University Press, 1994).
- Evans, David H. (ed.), *The Physiology of Fishes*, 2nd ed., (CRC Press, 1998).

Surfing the Web

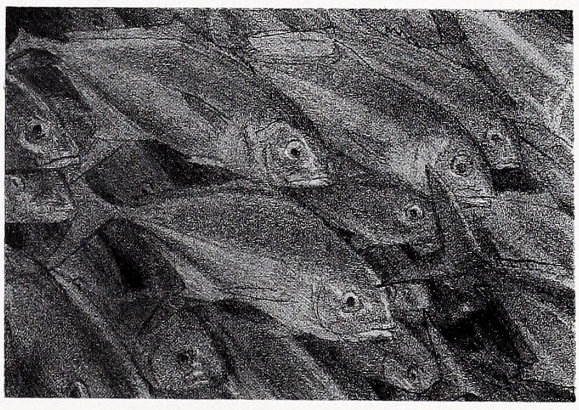
- For more information on fish senses, look up "fish" at the Encyclopedia Britannica web site. http://www.britannica.com
- For information on fish senses from an angler's perspective, see "The Senses of the Largemouth Bass and How They Relate to the Largemouth Bass's Feeding Habits." http://www.combat-fishing.com/bass_sense.htm

Trout hunt for food using primarily sight *and smell. Because of its complicated circuitry, a fish can detect not only the concentration and composition of complex compounds, but minuscule variations. Using taste and smell, some species can distinguish siblings from nonsiblings, or predators from prey.*



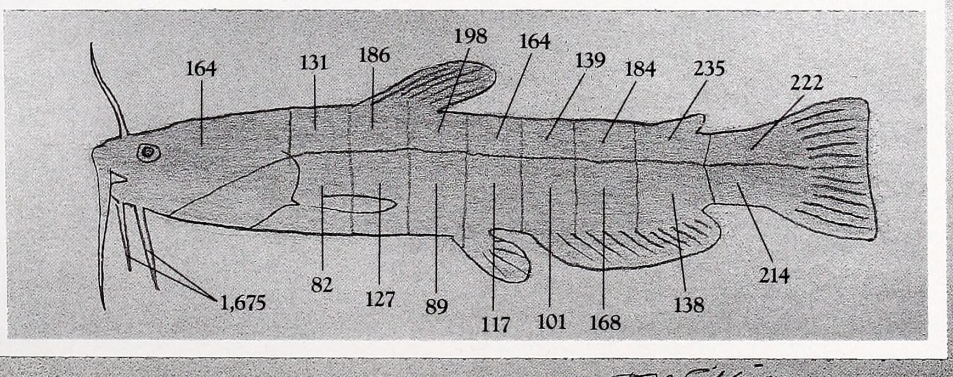
Source: *Trout*, Stolz and Schnell (Stackpole Books, 1991)

A trout's large optic nerves *and olfactory lobes are quite large, indicating the importance of sight and scent detection to the fish.*



Another sensory organ possessed by fish, *the lateral line, helps schooling fish escape predators and maintain spacing in the school.*

Source: *Biology of Fishes*, Bone et. al. (Blackie Academic, 1982)



Catfish are virtual "swimming tongues." *A yellow bullhead has more than 175,000 taste buds distributed over its body—plus many thousands more in its mouth and on its barbels.*

tiny trophies of the SMOKIES

Brook trout may not be big, but these speckled beauties offer fine sport for those willing to explore our high-mountain streams.

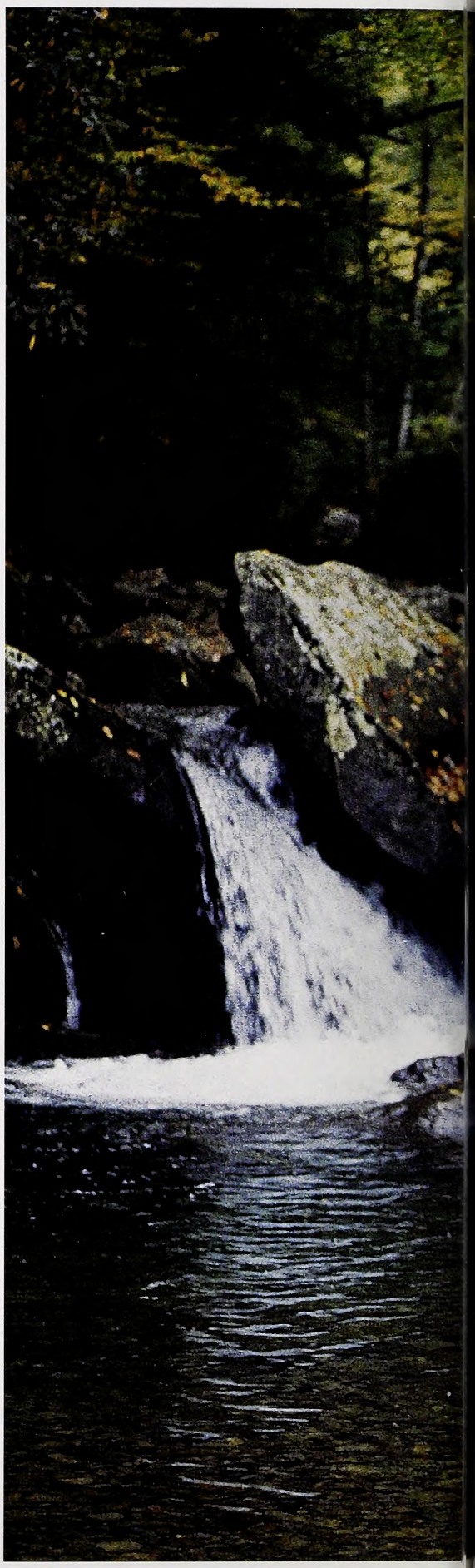
By H. Lea Lawrence ©2000

It wasn't a classic fly-fishing pose, with the angler hip-deep in a long, slick run and the line glinting in the sun as the curl opens on the forward cast. Instead, I was on my hands and knees in a laurel thicket, trying to poke my rod through an opening in the tangle so I could dabble a fly on the surface of a miniature pool. There was only about a foot of leader dangling from the tip.

To some it might seem absurd, but to those who cut their teeth on the wild brook trout of the Southern Appalachians, it represents a quite familiar scene. Unlike the inhabitants of the larger streams and rivers that many trout fishermen identify, the high-elevation brooks of the mountains aren't showcases for typical casting methods. Fly-fishing for brookies, or specks, as the locals often call them, requires an "anything goes" approach that extends far beyond what the average angler ever imagines. I think I've tried everything, too, from crawling on my belly to shinnying up a log leaning across an otherwise inaccessible pool. Still, I wouldn't bet there aren't more such challenges ahead.

Something else that might strike many anglers as odd is that the biggest fish I was likely to catch might reach 9 inches in length, with 5 to 7 inches being the average. In fact, the largest brookie I've ever taken from one of the highland streams measured 10 inches—a genuine trophy! Most fishermen scoff at fish this size, so they don't receive a lot of pressure. This is one of the reasons they're still fairly abundant, yet the principal factor is that not many anglers want to make a trek back into their home territory, which often means walking uphill for several miles.

Incidentally, as far as size is concerned, I see this as a matter of perspective. Just as beauty is in the eye of the beholder, so is the definition of *trophy*. In regard to beauty, the magnificent color of these little jewels is virtually beyond description, a combination of red, lavender, yellow, green and gold that makes one wonder why a different trout got the name rainbow. As for size, I've caught saltwater game fish that could swallow 100 brookies in a single gulp, but I can honestly


H. LEA LAWRENCE

Reaching the territory *of native brook trout often means trekking several miles up and off the beaten path to reach the high-altitude pools where these mountain beauties still have a foothold.*

JIM DEAN

***More akin to** hiking than fishing, stalking wild brook trout requires stamina and agility not necessary with many other angling pursuits. Among the many challenges is having to frequently scramble up lichen-covered rocks (bottom right) to reach the next headwater pool.*

say that landing them wasn't a bit more thrilling or satisfying than taking a tiny brook trout from a mountain stream. Considering the tackle and the environment, it was even less so.

There's another reason for referring to these bantam beauties as trophies: because they differ genetically from the northern brook trout. Both native and visiting anglers had long believed this to be the case, that they were a separate strain or subspecies. Finally, about a dozen years ago, researchers at Pennsylvania State University conducted a molecular-genetics study and determined positively that this was indeed true. Taxonomically, the two are now identified as northern brook trout and Southern Appalachian brook trout.

But back to where I began. It was late spring, with a powder blue sky and a soft, light breeze. The last of the early wildflowers and the first of the later ones were in bloom, filling the air with a special fragrance. The sunny spots were alive with bees and butterflies, and bird songs intermittently broke the silence.

The old logging road I followed to the stream was nearly obliterated by vegetation and small trees, and at places I had to guess its course. I surmised that few or, more likely, no fishermen's feet had trodden the path since my visit the previous fall. All I could detect were deer tracks. I wasn't surprised, because the stream is in a remote valley on U.S. Forest Service property, and there are no houses from its origin to where it flows into a larger stream miles below. There's no road access, either; I'd crossed through a gap on a high ridge to get to the upper reaches.

I know plenty of remote and isolated streams, but the one I was on is special to me. I first fished it more than 40 years ago, and it harbors valuable memories. Also, since it always seems to be the same, there's a true sense of time warp that's pleasant to experience.

As far as availability of brook trout streams in western North Carolina with public access, plenty of opportunity exists. Jim Borawa, regional cold-water research coordinator for the N.C. Wildlife Resources Commission, says brook trout are widely dispersed in 22 counties. Many of these are in national forests, and others on lands owned by timber companies that allow public access.

"Many of these populations are not large," Borawa explains, "and a lot of them inhabit very small headwater streams. Some encompass only a few hundred yards of stream, whereas others may cover several miles" (see "Finding Specks").

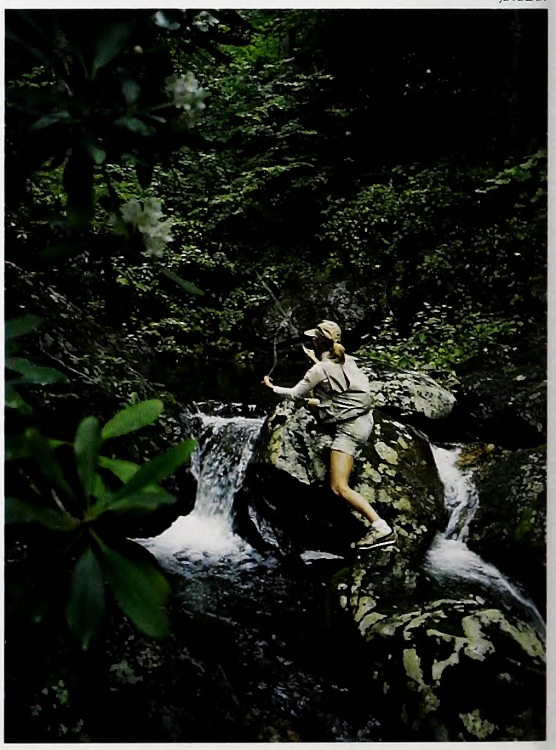
Tunneling through the laurel thicket paid off. I took two brookies from the pool and had to hand-walk the rod back so I could reach the leader to release them. I was able to toss them back into the water with an underhand throw. There actually wasn't a compelling reason for me to fish this particular spot, but I did so for nostalgic purposes. When I was a kid, I didn't overlook any water that might hold a fish.

Even though these high-country streams are very small, there are almost always some large plunge pools and deep holes along the way. These special places usually hold some larger fish, and often a couple of them can make an angler's day. I caught the 10-inch trout I mentioned earlier from a stream I could literally jump across, yet there were four lovely pools along its length that could be counted on to produce some nice specimens. In the old days I kept fish, but now I do so only once a year. I take home just enough for one meal. Brookies were the first trout I ever ate, and I don't want to break the tradition.

It would seem logical that short fly rods would be ideal for fishing these small streams, but this isn't necessarily the case. The roll cast is the angler's best tool in close cover, and it can be performed better with a longer rod, which also provides more reach with trying to get a fly into a tight spot. My preference is a 7- to 8-foot length in a pack rod configuration.

Where fly patterns are concerned, brook trout aren't too sophisticated, and often they'll swat anything that drifts past. It's understandable why: these

JIM DEAN



small waters don't produce a large supply of aquatic insects, and often there's a lot of competition for what's available. Some of the streams in the Great Smoky Mountains National Park have an additional problem. Exposed portions of the Anakeesta formation permit acid to be leached into the streams, further reducing their ability to produce food for the fish.

When I head for high-country brook trout locations, I carry along a small selection of dry flies and nymphs that have been winners over the years. Some have local origins, such as the Thunderhead, Yellow Hammer, Sheep Fly, Tellico Nymph, Green Gremlin and several Adams variations. In addition to these, other nymphs I favor are the Woolly Booger, Golden Stone, Black Stone, Caddis Larva, Gold Ribbed Hare's Ear, Pheasant Tail, Black Ant and Red Ant. Floater preferences are Adams, Green Humpy, Yellow Humpy, Tennessee Wulff, Black Elk Caddis, Female Olive Caddis, Grasshopper and Orange Palmer.

Some of the brook trout streams I frequent are little more than an hour's walk from where I park my car, and this affords a nice single-day trip. Others are far enough into the backcountry to make a two- to three-day trip more practical. There are few restrictions on camping on U.S. Forest Service lands, but in the Great Smoky Mountains National Park, this activity is permitted only at designated spots, and permits must be obtained for the more remote areas.

One thing to remember is that many of the streams in the Smokies are considered to be contaminated with *Giardia*, a dangerous intestinal parasite introduced into the water by the fecal matter of wild boars and raccoons. Using a filter system designed to remove these parasites, or boiling water before drinking or cooking with it, is recommended.

This was one of those "can't miss" days that give an angler the illusion of possessing great finesse. I covered nearly a mile of stream, changing fly patterns several times, and the brookies took everything I threw at them. When I landed one that measured 8 inches, I was tempted to make this my once-a-year day but decided not to. I did retain it long enough to get a couple of photographs.

At noon I ate a sandwich and a hard-boiled egg, washed it down with a soft drink, then lay back on some sun-warmed pine needles and looked up at the sky. Not for long, though; I was asleep within minutes and didn't wake until an hour later.

I started walking back downstream, dabbling my fly in a pool now and then, but I was more interested in my surroundings. At the base of a moss-covered rock at streamside, I spotted a yellow lady's slipper, a rare flowering sight nowadays. At one stop I heard a grouse drumming, and it seemed like every squirrel and chipmunk in the woods was on the move —more bonuses for the day.

I was deliberately dawdling, attempting to eke out every possible bit of pleasure from the environment. By the time I got back to the car, the sun had dropped below one of the flanking ridges, and the light was beginning to diminish. Evening comes early in the mountains.

A better way to spend a day? I can't think of one! ⊠

Finding Specks

Native brook trout, also called speckled trout, are confined to small, undisturbed mountain streams where they can avoid competition from larger non-native trout species, including rainbow and brown trout. Below is a list of river basins and the numbers of brook trout populations they contain.

Drainage	Number of Streams	Number of Populations
New River	33	33
Watauga River	3	3
Elk River	5	5
Yadkin River	30	24
Catawba River	29	27
Nolichucky River	55	29
French Broad River	87	45
Pigeon River	42	19
Savannah River	28	19
Little Tennessee River *(includes Nantahala River)*	102	65
Tuckasegee River	45	25
Hiwassee River	12	6
Totals	**471**	**300**

Some of the streams are in the Great Smoky Mountains National Park, where a brook trout restoration program is under way, and all or parts of some streams are closed to fishing. However, there are also many streams in the park where it's legal to fish for brook trout, but no fish can be retained. Information on park stream regulations, including a list of those closed to all fishing, can be obtained from: Great Smoky Mountains National Park, 107 Park Headquarters Road, Gatlinburg, Tenn. 37738, (423) 436-1200. General North Carolina trout fishing regulations can also be found in the *1999-2000 Regulations Digest*, available at local tackle shops.

The best way to locate prospective places and points of access, whether in the national park, in a national forest or on privately owned lands, is to obtain U.S. Geological Survey topographical maps of the counties you wish to explore. They can be obtained from the N.C. Geological Survey; call (919) 715-9718.

Woolly Booger

Thunderhead

Sheep Fly

Green Gremlin

Orange Palmer

Yellow Hammer

.the ultimate Big-game challenge

Think you've done it all? Hunting a long-beard with a bow will test you like nothing else.

written and photographed by Mike Gaddis ©2000

Gunned your share of long-bearded gobblers? Got a massive whitetail on the wall? A Hyde County bruin the size of an oil drum? A mountain boar from the Blue Ridge?

Congratulations—you're among North Carolina's hunting elite.

Want to push the envelope?

Ask 10 seasoned Tar Heel hunters who've done it all on bear, deer, boar and turkey what is the most demanding sport the state has to offer, and I'm betting the consensus will be—taking a spring gobbler with a bow. To be successful in this arena you need all the skills that hunting a tom with a gun takes, plus versatility with a bow, discipline, perfect shot placement and a host of subtleties regarding camo, distraction, set up, teamwork and gear. The slightest glitch in any of these will spell the difference between success and failure.

Just so you understand: at 20 yards on a laser-eyed tom, the difference between pulling a trigger on a gun and getting a bow back is the difference between climbing an ant hill and scaling the Andes.

That said, if you're still intrigued to the point of commitment, you're about to experience perhaps the most demanding and exhilarating confrontation of your life.

Right on top of the short list (the long list doesn't exist) of bowhunters who've consistently and successfully hit the mark is Larry Long of Stanley County. Larry, the N.C. Bowhunters' Association's "Bowhunter of the Year" for 1995, and a resident expert at the new Bass Pro Shops store near Concord, has taken a dozen gobblers with the bow. Remarkably, all came from pressured, public land. That's a mean feat, even with the gun; with the bow, it's bordering on the phenomenal. More amazing, Larry hunts with a classic 68-inch longbow, not the easiest item to wield effectively in a turkey set-up.

From his bag of tricks, with a modest few from my own, here are some thoughts to take to the woods.

Preparation. Getting ready is equal parts physical and mental. There are two "secrets" to successful turkey hunting: knowing how a bird will travel, and patience.

The work starts in March with pre-season scouting. Listen, slip along, watch and listen with two goals: discovering the presence of a huntable tom and the route he takes between roost and strutting post.

"Knowing where a turkey's gonna go," Long advises, "is 90 percent of making it happen, 5 percent is calling, and the rest

is blind, dumb luck! He'll go out of his way a little for a call, but not much. If you can get somewhere close to where he will travel, the odds increase tremendously that you can get him in."

Patience, applied to turkey hunting, is self-discipline taken to the highest level. "Most people aren't ready for the four- or five-hour sits it sometimes takes to get a bird in, particularly a heavily hunted bird or a wise old limb-hanger," Larry cautions.

Two years ago, I finally killed a tremendous old gobbler in Granville County on a drizzly morning three weeks into the season. He was a call-shy rascal, wouldn't gobble a lick and kept me guessing at every juncture. I sat down two hours before daybreak, and he silently trickled in at a quarter before noon. He was turkey hunting's finest challenge—what many of us go for.

But it takes fortitude to sit, virtually immobile, that long. You have to train for it, not just mentally but physically as well. Start training your bodily functions as early as March. Avoid heavy breakfasts and liquids, especially caffeine, which increase the urge to go.

Not that every turkey will require a Spartan sit. Larry's second bird last season was a 30-minute deal. But prepare for the worst case.

Set-Up. Choose an ambush site a discrete distance from a roosting site along the corridor of travel you expect the bird to take. Back up to a big tree, burrow into the fringe of a blow down, sit against a heavy clump of brush, and take mental stock of your setup.

"Think about the travel of the sun," Long suggests. "It's a great advantage to be in shadow."

Don't make the mistake of concealing yourself to the extent that it will hamper your ability to see an incoming bird or make the shot. Neither do you want to be silhouetted after first light. Strike a happy medium. If you shoot right-handed, position yourself relative to the anticipated arrival of the bird so that you will shoot comfortably off your left side. Left-handed hunters should do the opposite. This will provide the greatest range of motion and least movement for a shot. Pull your bow and check it out. Quietly bend back any twigs that will hinder your draw or block your sight picture. Do it now. You can't later.

Decoy placement is critical. Position the decoy at about 20 yards to one side and slightly beyond your stand, so that the approaching bird will walk by you en route to the decoy. This ploy can be greatly enhanced if you have a seasoned buddy who can call from the off-side of the decoy, and pull the bird by you.

Lay out your calls, pull on and check your camo and settle in. Call sparingly and subtly. The old adage of "call once, sit still eight times" is dead on.

Remember, we're after turkey, and all this attention to detail won't amount to a hill of beans sometimes, but morning-in, morning-out, it's the best you can do.

Shooting Strategy. There's only one strategy—sitting, either at dirt level or on a low stool. You sit for two critical reasons: It's the best way to conceal the movement necessary to draw the bow and make the shot. And it avoids the terror all wild creatures associate with the vertical human form.

Last year, just to see what would happen, I forced the latter half of that logic on a hen and two jakes that lingered around a decoy after I'd shot the gobbler. Purposefully I

***Looking for something** to spice up your spring turkey hunting? Trade your shotgun for a bow, but be prepared to pay the price in patience. Taking a spring gobbler may require a four- or five-hour sit in close cover.*

TAKE THE RIGHT GEAR

BOWS: Whether you use a traditional bow or a modern compound bow is a personal choice. Larry Long pulls about 68 pounds of draw weight at 28 inches with his laminated "Fuzz" Lytle longbow. His instinctive shooting style means it's "pull, touch and gone" with the arrow, once it kisses his anchor point. There's a lot to be said for the speed and simplicity of that. He uses a regular, two-bladed broadhead without a stopper point to deter penetration, either a Bear Razorhead or a Zwickey Delta. Birds hit vitally are usually anchored, and quickly recovered.

For me, it's Fred Bear's Epic Extreme, an ultra-compact compound bow. Axle-to-axle, it's only 32 inches, an especially well-designed bit of magic that scales less than 4 pounds fully rigged. The light weight and working clearance of the short limbs are nimble assets in a turkey setup. Moreover, its 75 percent let-off means you can sustain a full draw longer, waiting for the right shot. This is a persuasive argument for a compound bow. The lethal end of my arrow is fitted with a 125-grain Thunderhead.

CAMO: Choose any all-around pattern such as Realtree X-tra Brown, Advantage or Mossy Oak Break-up. Just be sure it's complete to your bootlaces. You have to let a turkey in closer than when you're hunting with the gun, and you must move more when he's in tight. There's little margin for error. Watch for short pant cuffs that ride up to expose white shins, fingers that poke from gloves, shiny ears that peek past face masks. Avoid bright arrow fletching.

DECOY: A single hen is enough. With the bow, you need the distraction, and a strategic placement of the dupe can influence the approach of the bird. Motion decoys that mimic feeding or breeding behavior are especially effective. Teddy Roberts and I tested a new remote control hen by Expedite Inc. last season that was absolute dynamite! The live action and a little finesse calling actually held tom for Teddy's successful second shot, after a blown first attempt.

SEAT: Carry a waterproof seat cushion or a small stool. After an hour or so, neither will be especially comfortable anymore, but much better than trying to remain still with a wet bottom on bare ground.

CALLS: Be sure your call arsenal includes a diaphragm mouth call. Know how to use it. When a gobbler's in bow-close, you can sometimes maneuver him a bit with a subtle cluck, especially if you can't afford the luxury of movement necessary with a box or slate.

shifted away from the tree into sunlight, then eased slowly back. Heads jerked up, bodies tensed, but they just stared, trying to make me out. I moved more obviously. Same thing. Waved my arms gently. The birds tensed and squatted, but they tolerated it, relaxing slightly when I froze again. Finally I stood slowly up. Gone! In a clatter of wings.

Larry shoots from a dove stool. That's how he manages that 68-inch longbow he loves. Others, including Teddy and I, sit on the ground as you would with the gun.

Practice shooting sitting at a McKenzie turkey target until you're consistently good at 20 to 30 yards. Train with exactly the gear you will hunt with, down to face mask, vest, cap and gloves. Face masks tend to bunch when sitting that compactly. Make adjustments to your mask for visibility and kisser buttons. If you shoot right-handed, the left eye-hole may need to be a hair larger; right-handed, it's vice versa. Tilt your cap brim slightly right or left.

Check your yardage estimates. The perspective on yardage is different from the lower angle.

Making the Shot. It's happening! He's coming, trailing two hens. The birds trickle out of the hedge row that divides the two fields. Iridescent feathers snare the sunlight, toss it back in a shatter of black, green, copper and rose. Your partner clucks softly. The hens break into a trot, running toward the decoy. The gobbler follows, his big head pulsing crimson, his massive beard flopping back and forth with the beat of a floppy gait. Your heart is beating out of your chest, and your foot went to sleep an hour ago. Already, easily, you could have taken him with the gun. But it is more than the bird, it's the test. Just how good am I, you're asking yourself.

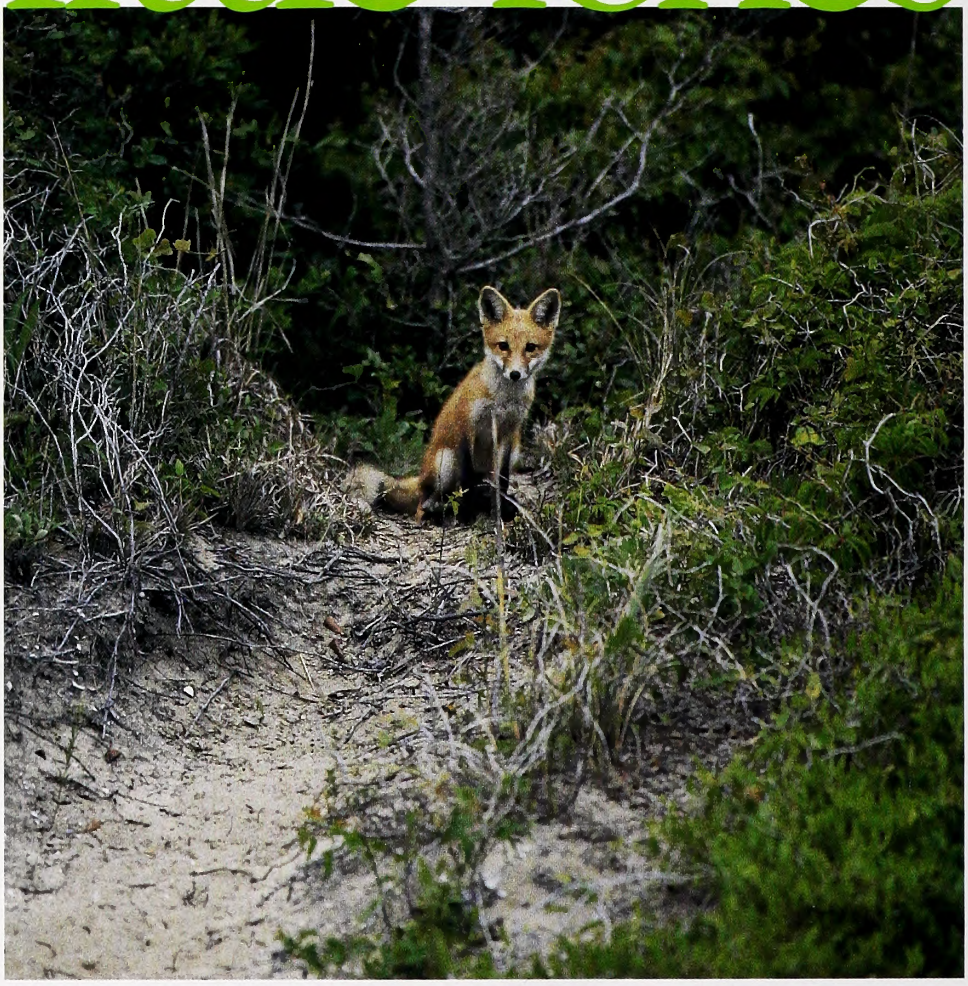
Explosively, he breaks into a strut. Pirouetting so closely you can feel him, hear the humming and spitting. An eternity passes in the space of three minutes. He breaks the strut, shuffles five steps, spreads again. Wait, wait. *Now*! His head is tucked behind his fan. The hens are occupied with the decoy. Now! In a smooth rhythm, the bow is back. He twirls. The sight pin is on his wing butt. His strut suddenly droops and his head jerks upright. He's made you! In the utter quiet of the same instant, the thump of the bow is as startling as a gun shot.

The hens jump skyward with fright and beat heavily away. You jerk your face mask off, fighting for breath. You companion is up, running, whooping.

Flopping on the green carpet of a winter wheat field at 8:30 on a glorious, sun-blessed April morning, fallen to an arrow —your arrow—is North Carolina's supreme big-game challenge.

With excellent *preparation, set-up and shot selection, you may just bag that gobbler of a lifetime this spring with a bow.*

little foxes

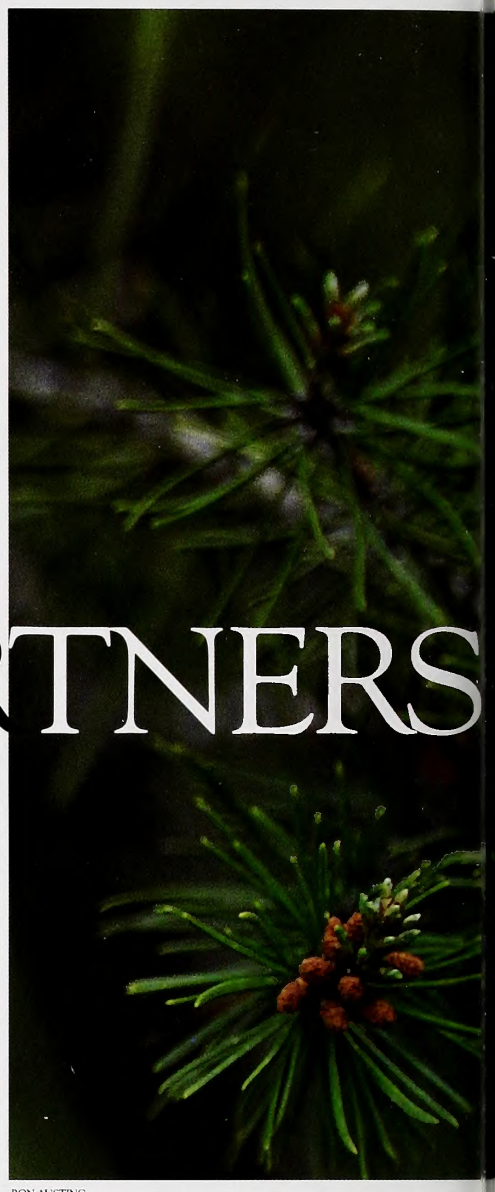


photographed by Ken Taylor

Just a few months old, a litter of fox pups emerges from its sandy den to explore the wonders of a bright, new world. With its

parents off hunting, one pup keeps watch as its siblings frolic in the April sunshine. All too soon, the little foxes will shed their puppy fur and have to get down to the serious business of survival as adults. By fall, they will be on their own. But October is a long way off...and spring is the time to explore and enjoy the play of youth. ⊠

DISTANT PARTNERS



RON AUSTING

Protecting migratory songbirds takes work on both the breeding and wintering grounds. A model effort on behalf of these birds is linking ornithologists in North Carolina and the Bahamas.

written by Mark E. Johns

Wildlife species don't always observe political boundaries, and migrating birds observe them perhaps less than most. That's why successful efforts at conserving birds that breed in North America and winter in the tropics must be aimed at both ends of the birds' range. That requires a lot of cooperation and tact.

A model partnership to do just that was recently crafted between the North Carolina State Museum of Natural Sciences and several national and university organizations in the Bahamas, a chain of islands off Florida. The Bahamas are an important wintering destination for many migratory birds that breed in North Carolina. The partnership is under the direction of the International Partners in Flight program which, in North Carolina, is coordinated and supported through the N.C. Wildlife Resources Commission.

The partnership is formally between the North Carolina State Museum of Natural Sciences, the Bahamas National Trust, the College of the Bahamas and the Bahamas Department of Agriculture, and it's directed by the International Partners in Flight program. In North Carolina, Partners in Flight is coordinated and supported through the Nongame and Endangered Wildlife Program of the N.C. Wildlife Resources Commission.

"A number of years ago, we were asked to help teach a newly formed ornithology group in Nassau, the capital city, identify North American migrant birds," said David Lee, curator of birds at the N.C. State Museum of Natural Sciences and the catalyst behind the conservation effort. Lee is also the chair of the international working group of the N.C. Partners in Flight.

"The people in the Bahamas knew the resident birds; it was the flood of winter migrants that was perplexing," Lee said. "They were of course seeing our breeding birds when they were in their most confusing plumage. We asked them, 'What do you need?' They told us that they needed to learn more about the ecology and natural history of neotropical migratory birds," said Lee. They also wanted more knowledge about birds that are endemic to the Bahamas and those found in nearby places such as Cuba that also occur in the Bahamas.

From these early meetings in 1992, Lee saw an opportunity for the partnership to become more than just a "Band-Aid for birds." It had the potential to be a perfect joint venture that would contribute positively toward conserving an entire ecoregion, in an island system with a number of species of plants and animals found nowhere else in the world. It could also help protect birds that breed in North Carolina.

The actual focus of much of the work done through the partnership is the islands' pineland ecosystem, dominated by the Caribbean pine, a tropical lowland pine species of the West Indies and Caribbean Basin. The Caribbean pine is the only member of the pine family native to the Bahamas and is closely

DAVID S. LEE

***Scores of neotropical** songbirds that breed in North Carolina, as well as the endangered Kirtland's warbler (above), winter in the old growth pine forests of Grand Bahama Island (right). Bahamians and North Carolinians are partnering to conserve the shrubby understory needed by these birds.*

related to the slash pine of the southeastern United States. The pine forests are important habitats not only for the wintering birds coming from North America, but also for a number of other plant and animal species, such as the endangered Bahamas parrot.

Countless other rare and endemic plants and animals of the Bahamas will certainly benefit from management, conservation and educational efforts inspired by this partnership. The closeness of the Bahamas to both temperate and tropical regions results in an unusual mix of flora and fauna from both

zones. There are more than a dozen species of bats native to the Bahamas. A blind cave-dwelling fish is known to exist only in a few caves on New Providence and Grand Bahama islands. There is only one native land mammal, the Bahama hutia, which was believed extinct until rediscovered in the 1950s. Bahamian rock iguanas were formerly common on the mainland islands, but these large reptiles are now restricted to offshore cays because of predation by locals, settlers and introduced dogs and cats.

The Bahamas and Greater Antilles are important wintering or migratory stopover points for scores of neotropical migrants that breed in North Carolina. During our winter, neotropical migrants such as redstarts and prairie warblers pulse down from North America. The pine warbler, one of several species typical of the American Southeast, is also found in the Bahamas, but over time it has become distinct enough to be considered a separate race or subspecies. Yellow-throated warblers, which commonly occur in North Carolina also migrate to the Bahamas, but isolation has evolved a distinct nonmigrating form there. Lee is in the process of describing it as a separate species. The hairy woodpecker is another example of a North American species that has expanded its range to the Bahamas. An important resident of the pine forests, it drills holes in dead pines to make nest cavities, which are often used later by other animals for nesting and shelter.

Another bird that is receiving special attention is the highly endangered Kirtland's warbler. Though this wood warbler breeds in brushy, young jack pine stands in Michigan's Lower Peninsula, and its wintering grounds are restricted basically to the Bahamas, some of these warblers migrate through North Carolina. It has been described as America's rarest songbird. Not too long ago, the bird's numbers hovered around 200 and the species was on the verge of extinction. But changes in forest management have restored population numbers to about 3,000 birds today.

Lee has been extensively involved in a host of projects that will directly benefit the region by providing information for local parties to build better conservation strategies, and that will offer important environmental education opportunities for the Bahamas. A slide set developed for distribution focuses on the ecology of Bahamian pine forests. "This slide program will be an important tool for teaching Bahamians the importance of an ecosystem that has been largely ignored," noted Eric Carey, chief conservation officer of the Bahamas. "Most of our rare and endemic species are residents of this forest type."

New information gathered by Lee and his research team indicates that fire may be important for helping to create the type of habitat needed by the Kirtland's warbler. Fire clears the ground, reducing competition and providing sunlight for new pine seedlings to establish and grow quickly. The openness of the forest crown allows for good light penetration, making possible the dense growth in the shrubby understory used by the Kirtland's warbler and scores of neotropical migrants that breed in North Carolina. "The attention given to a high-profile species like the Kirtland's warbler will provide conservation incentives for both island endemics and North Carolina Neotropical migrants sharing the same habitat," Lee said.

Increased land clearing associated with agriculture, industry, housing and tourism still threatens the birds, and other factors are also playing a role. Raccoons, introduced from the southern United States, and feral cat populations on most islands may prey on eggs and chicks of ground-nesting birds like the rare Bahamas parrot. Ironically, these are some of the same problems facing some neotropical migrants in the southern United States. Solutions for one region will likely provide answers for the other.

In 1990, Partners in Flight recognized the Bahamas partnership with an international award. Everything in the partnership is a group decision and the Bahamas and North Carolina share resources to get things done. Dave Lee recognizes that it is "not our country" and that respect and communication are vital to success. The Bahamas gain valuable information on birds and other species, important knowledge to guide management of pine forests in the region, and data to help counter developmental ventures that may harm endangered or rare animals like the Kirtland's warbler. Already the Bahamas National Trust, which manages the park system, has agreed to work with other partners to focus future research in the parks aimed at providing management information to benefit resident and neotropical migratory birds, some of which are North Carolina nesters.

Working partnerships go hand in hand with an informed public. In the process, scores of migratory songbirds that either nest in North Carolina or stop over during migration will fly into a more secure future. ⊠

Mark E. Johns is a nongame biologist with the N.C. Wildlife Resources Commission, and he coordinates the N.C. Partners in Flight program.

DAVID S. LEE

Tar Heel Birds in the Bahamas

Thirty-eight neotropical bird species that breed in North Carolina winter in a variety of habitats on the Bahama islands. Another 27 North Carolina species migrate through the Bahamas on their way to winter habitat farther south.

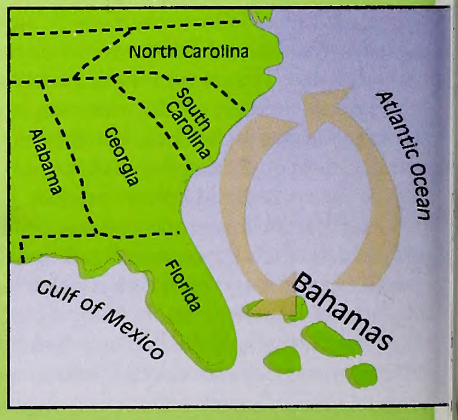
Some of the species that use pine forests are listed below:

Wintering Species

Turkey vulture
Sharp-shinned hawk
Gray catbird
Blue-gray gnatcatcher
White-eyed vireo
Yellow-throated vireo
Black and white warbler
Black-throated blue warbler
Yellow-throated warbler
Prairie warbler
Ovenbird
American redstart
Common yellowthroat

Migrant Species

Yellow-bellied sapsucker
Palm warbler
Merlin



going native

-Southern sundrops

MELISSA McGAW

More and more nurseries are encouraging gardeners to use native plants. And why not? Natives not only add sizzling colors to gardens from spring to fall, but also restore lost connections between plants and wildlife.

written by Rob Gardner ©2000

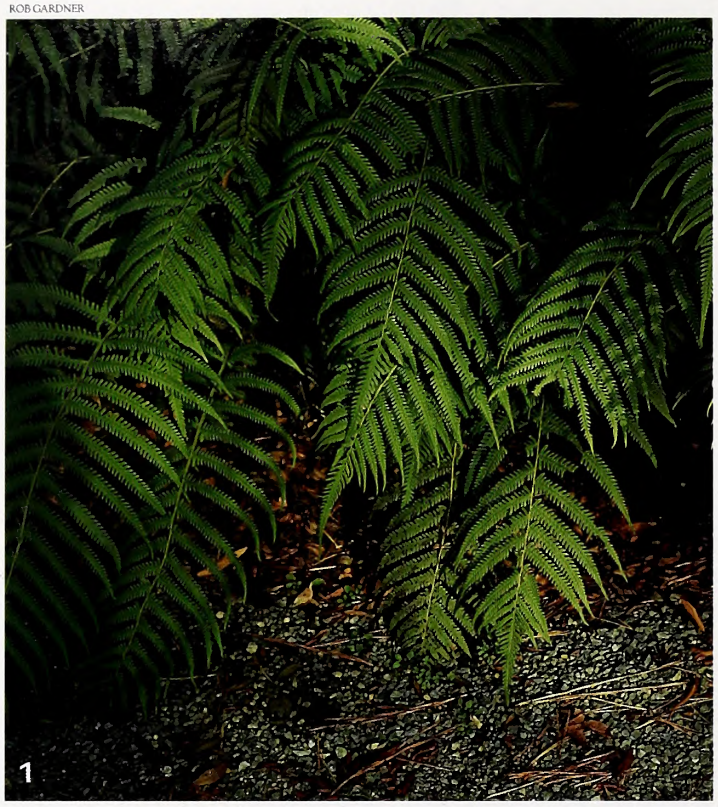
North Carolina has one of the most varied groups of natural communities in the country. From coastal dunes to mountain balds, from Carolina bays and longleaf pine savannas to the deep cove forests of the Southern Appalachians, our "natural gardens" nurture many hundreds of plants—delicate ferns, exotic orchids, beautiful lilies, weird insect-eating plants and some of the most stately and graceful trees and shrubs in the world. North Carolina's treasure trove of native plants is one of the most diverse in the nation, placing only behind California and Texas.

Gardening with native plants is no longer the domain of a select few wildflower enthusiasts but has become a mainstream activity for all gardeners. Long ignored, our native plants are finally enjoying broad popularity in their homeland. European gardeners, particularly in England and Germany, have long appreciated the grace, durability and diversity of our wildflowers, and they have done extensive breeding and selection with them. Asters, goldenrods and black-eyed Susans are just a few of the many groups of our native plants that have been to European finishing school. In the United States, amateurs and professionals alike are selecting and breeding native plants. Many new selections are on the market, but in many cases, it is difficult if not impossible to improve on the plain old wild types.

In the following pages are just a few ideas on what plants you can grow, depending on the proportion of sun and shade in your garden. There are many colorful plants to choose from, and combinations that will keep your garden flowering from spring to fall.

Gardening with Shade-Loving Native Plants

ROB GARDNER



ROB GARDNER

1-Southern shield fern
2-American alumroot
3-Eastern columbine

MELISSA McGAW

UNDERSTANDING THE KIND OF SHADE THAT IS IN YOUR GARDEN is a very important step in deciding which plants to grow. Even the most confirmed shade-loving plants don't like the deep, permanent shade cast by evergreens or the perpetual shade produced on the north side of a large building. Much more desirable is the kind of dappled shade under scattered, open trees.

You can begin to achieve the desired kind of shade in your garden by removing any invasive non-native species like Japanese honeysuckle, Russian olive, Chinese privet, English ivy and the host of other invasive alien species that are taking over natural areas and backyard gardens alike. Removing these weedy foreigners will allow a bit more sunlight to enter and make your garden much more conducive to growing native plants as well. Next, you might consider removing some low-hanging and damaged branches on remaining trees. This too will allow a little more dappled sun to enter the garden, and make your garden much easier to tend.

Foliage is the heart of all shade gardens. Spring brings a flurry of wildflowers in shady gardens: bleeding heart, various kinds of phlox, foamflower, violets, stonecrop and many others seem to bloom all at once. It is a dramatic but passing spectacle. As the growing season wears on, it is the contribution of foliage that carries any shade garden through the summer and into autumn. Plants like ferns, sedges, deciduous wild ginger, little heartleaf, American alumroot and others add texture, background and definition to shade gardens. Foliage plants add their own color to shade gardens—emerald green, chartreuse, bluish green, gray green, forest green. All blend to make a beautiful tapestry that is a variation on a single color theme.

Here are a few easy-to-acquire and easy-to-grow native plants that are beautiful choices for any shady garden.

American alumroot *(Heuchera americana)*

American alumroot is a star in a shade garden because it is such a useful native foliage plant. It is valuable in the front or middle of the shady border individually, in mass or in combination with other plants. This native usually produces five lobed, coarsely toothed leaves. New spring foliage may be washed in silver or pewter markings, which often persist. Each leaf is borne on a stem that rises from the central base of the plant. Mature plants usually grow 6 to 8 inches tall.

Small purple or greenish purple flowers usually appear in late spring on long, wiry stems rising 12 to 15 inches above the foliage. The flowers are interesting but not especially showy; the evergreen leaves are the real attraction.

American alumroot is easy to cultivate and can be grown in average to moderately dry soils if well established. It is doubly useful because it retains its foliage through the winter months, adding interest to the garden every day of the year. It is a great companion to many other shade-loving wildflowers, including foamflower, creeping phlox, native sedges and maidenhair fern.

Bleeding heart *(Dicentra eximia)*

Few native perennials are so valuable in the shady garden as bleeding heart. The delicate foliage, which grows up to 15 inches tall,

is a perfect foil for the heart-shaped pink flowers that hang in gracefully arching sprays. Unlike many other wildflowers with pronounced blooming periods (usually for 10 to 14 days), bleeding heart begins blooming in the spring and produces a succession of flowers that last the entire growing season. Long-lasting and beautiful as these delicate flowers are, it is the graceful blue-green ferny foliage that is the most valuable asset of this all-star native. If happily sited, bleeding heart will continue to produce the delicate-looking but durable foliage that is so important to any shade gardener.

Eastern columbine *(Aquilegia canadensis)*

One of the most widely recognized of our native wildflowers, eastern columbine is also one of the most beautiful. Its ease of growth also makes it one of the best of our native wildflowers for shady to partly sunny gardens. The delicate, nodding flowers of pastel red and yellow resemble an elaborate crown. Eastern columbine is a spring bloomer that happily reseeds but is never weedy. It is tolerant of a wide range of cultural conditions and combines well with many other shade-loving plants, especially ferns.

Southern shield fern *(Thelypteris kunthii)*

Although southern shield fern has been part of our native vegetation since pre-Columbian times, it is just beginning to gain popularity beyond a small group of knowledgeable plant enthusiasts, and rightly so. For a fern, it is amazingly durable and attractive, two attributes that would endear it to any gardener. Southern shield fern can even take full sun in sites where the soil is rich and not excessively dry, but like most other eastern ferns, it really prefers some shade. It spreads by short underground rhizomes, which can slowly increase to make thick clumps. Arching stems up to 4 feet tall and a foot wide at the base create a lush thicket of lime-green fronds. A deciduous species, southern shield fern can turn a surprising purplish bronze in November once the evening temperatures start to hover at or just below freezing. After a few killing frosts the fronds turn a not-unpleasant tawny color and become somewhat arched but stay basically upright throughout the winter months, maintaining their place and their interest all year long. Trim back these old fronds in the spring before new growth begins.

This fern is a pest-free, undemanding plant suited for Piedmont and Coastal Plain gardens and protected microhabitats in more westerly counties of North Carolina.

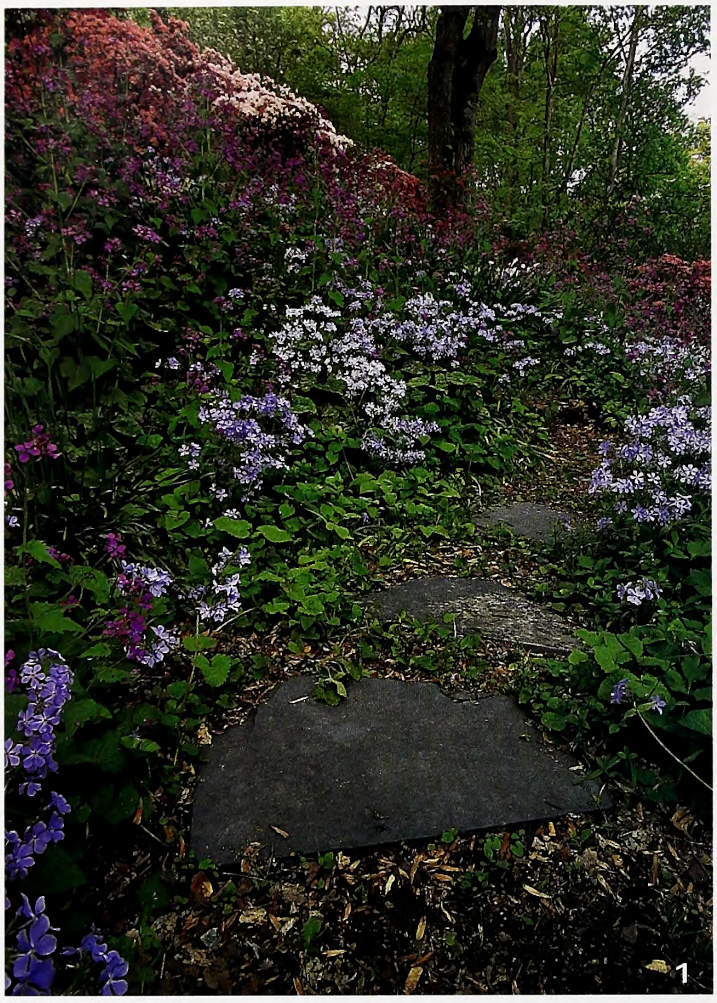
Native Sedges for Shade

In the shade garden, native sedges are foliage plants of great value because of their notable textural qualities which contribute to the shade garden year-round. They can be bold or delicate, evergreen or deciduous, depending on the species you select. Certainly not the first plants that come to mind when planning a native shade garden, sedges can, nonetheless, contribute greatly to the overall effect of a small garden and even give a certain degree of refinement, for which they are seldom credited. They are the green punctuation marks in the garden and serve as companions and connectors to more traditional shade-loving wildflowers. They can look great on their own or when grown beside or among rocks.

1-Gray's sedge
2-Woodland sedge

ROB GARDNER

ROB GARDNER



PHOTOGRAPHS BY MELISSA McGAW

1-Woodland phlox
2-Woodland phlox and Southern maidenhair fern
3-Green and gold

Here are three of the best.

Gray's sedge *(Carex grayi)* is a deciduous sedge that grows 2 feet tall with lettuce green grass-like leaves 1/2 inch wide. It is most interesting when it is in fruit. Gray's sedge produces long-lasting starlike inflated seed pods that are very showy. They rise above the foliage and persist, eventually turning an attractive buckskin color which is beautiful in the garden and a great addition to flower arrangements.

Plantain leaf sedge *(Carex plantaginea)* has bold evergreen leaves that grow 8 to 10 inches tall and 1 inch wide. The leaves have very pronounced, raised parallel veins that give them a distinctive

Other Shade-Loving Native Perennials

- Creeping phlox (*Phlox stolonifera* "Bruce's White," "Sherwood Purple" and "Home Fires")
- Deciduous wild ginger *(Asarum canadense)*
- Eastern blue phlox *(Phlox divaricata)*
- Foamflower *(Tiarella cordifolia)*
- Great blue lobelia *(Lobelia siphilitica)*
- Green dragon *(Arisaema dracontium)*
- Green and gold *(Chrysogonum virginianum)*
- Indian Pink *(Spigelia marilandica)*
- Jack-in-the-pulpit *(Arisaema triphyllum)*
- Jacob's ladder *(Polemonium reptans)*
- Little heartleaf *(Hexastylis minor)*
- Northern maidenhair fern *(Adiantum pedatum)*
- Solomon's plume *(Mianthemum racemosum)*
- Southern lady fern *(Athyrium asplenoides)*
- Southern maidenhair fern *(Adiantum capillus-veneris)*
- White wood aster *(Aster divaricata)*
- Woodland stonecrop *(Sedum ternatum)*

Native trees and shrubs for shade

- Oak-leaf hydrangea *(Hydrangea quercifolia)*
- Florida anise tree *(Illicium floridanum)*
- Florida hobble-bush (*Agarista populifolia*, formerly called *Leucothoe populifolia*)
- Silver leaf hydrangea *(Hydrangea radiata)*

Deciduous azaleas

- Smooth azalea *(Rhododendron arborescens)*
- Dwarf azalea *(R. atlanticum)*
- Florida flame azalea *(R. austrinum)*
- Flame azalea *(R. calendulaceum)*
- Piedmont azalea (R. canescens)
- Pinxter flower *(R. periclymenoides)*
- Plum-leaf azalea *(R. prunifolium)*
- Smooth azalea *(R. viscosum)*

corrugated look. It is native to our Mountains but is perfectly happy growing in most areas of the state provided that it is planted in a relatively shady site that is not too dry. Plantain-leaf sedge is one of our most distinctive and desirable native sedges.

Woodland sedge ***(Carex flaccosperma)*** is another very attractive native sedge with relatively wide evergreen leaves. This southeastern native is especially valuable because its leaves have a very beautiful bluish green cast to them, making it unique among the commercially available native sedges.

Sedges look great on their own or combined with other natives like American alumroot, green and gold, creeping phlox and small- to medium-sized ferns like northern or southern maidenhair fern.

Native Perennials for Sunny Sites

WHETHER YOUR IDEA OF SUNNY PERENNIAL GARDENING INVOLVES a very small planting along the sidewalk or a full-blown perennial bed that blooms from spring to fall, native plants fit the bill.

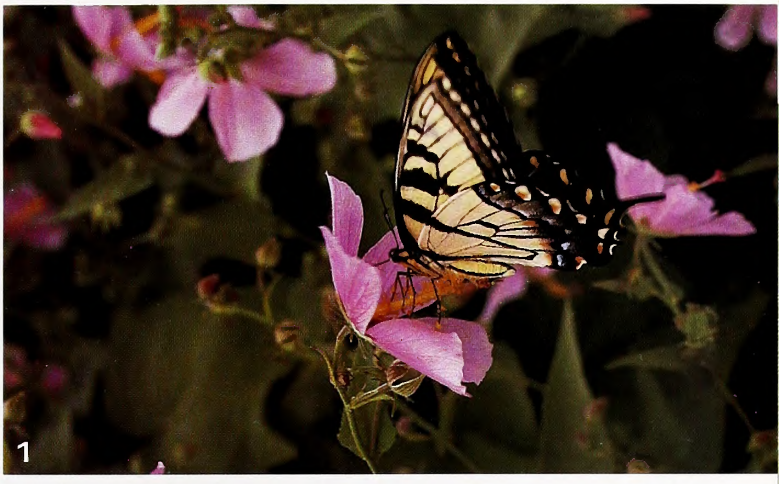
The basis of wildflower gardening in sunny situations is the same in any case: six to eight hours of direct sunlight, soil that is enriched with organic material, and adequate moisture during dry periods.

Morning and early-afternoon sunlight are best for native perennials. Sun-loving plants that don't get sufficient light tend to be uncharacteristically lanky. As they stretch for the light, they are much more likely to flop in the wind and rain. It is often useful in the central and eastern part of the state to provide some afternoon shade during the height of the summer to prevent overexposure. Remember that plants are very strongly oriented toward the light, and their flowers almost always face the sun. Place your native perennial bed where the flowers will be facing the direction from which they will be viewed most often.

To grow healthy wildflowers, you must provide healthy soil. Wildflowers are like any other plant—the more favorable the conditions you provide for them, the more productive and beautiful they will be. If there is a single "secret" to growing wildflowers successfully, it is the soil. When starting a new sunny wildflower bed, it is important to add organic material in the form of rotten leaves, compost, topsoil or other amendments that are rich in organic material. Work this material into the soil to a depth of 6 to 8 inches before you plant. This kind of organic material increases soil fertility and attracts a multitude of beneficial soil organisms. It also acts like a sponge to retain moisture and make it available to the roots of your plants during dry periods. If you have an established perennial bed, add a 2- to 3-inch layer of compost or decomposed leaves to the top of your perennial bed in the late fall when you tidy things up in preparation for the winter dormant months. Wildflowers—indeed, all perennials—benefit in a host of ways from regular additions of some kind of composted organic material.

One other important thing to bear in mind is that, for the vast majority of our state, planting your wildflowers in the fall is essential to getting them well established and ready for the rigors of the growing season. This is especially true for wildflowers that are touted as drought tolerant. Roots of fall-planted wildflowers continue to grow as long as the soil temperature is in the 50-degree range, often long after the air temperature has dropped below that temperature. When spring

ROB GARDNER



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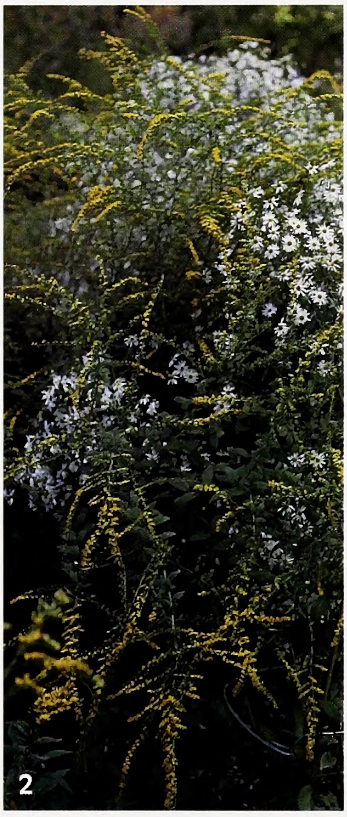


ROB GARDNER

MELISSA McGAW

1-Seashore mallow
2-Rough leaf goldenrod
3-Southern sundrops
4-Blue wild indigo

ROB GARDNER

1-Butterfly milkweed
2-Carolina bush pea

MELISSA McGAW

arrives, roots and plants are well established and ready for the hot and often dry summer months.

Here is a sampling of some of the many garden-worthy, sun-loving native wildflowers.

Seashore mallow *(Kosteletskya virginica)*

Seashore mallow is a rarely grown but stunningly beautiful late-summer bloomer. It can grow 5 to 8 feet tall and bears beautiful 3-inch flowers at the upper portion of the many-branched plant. The five-petaled, bright pink blooms with a central column of yellow stamens offer a refreshing change from the flurry of yellow-flowered plants that bloom in the fall.

Often found growing in brackish marshes in the eastern part of our state, seashore mallow is equally at home in gardens throughout North Carolina, including the Southern Appalachians.

Anyone who has seen this native perennial growing in its natural haunts can testify to its graceful pyramidal habit and extravagant floral beauty (a mature plant can produce hundreds of flowers in a single season!). Why it has not received the horticultural attention that it so richly deserves is a mystery.

Other great wildflowers in the mallow family include halberd-leaved marsh mallow *(Hibiscus militaris)*, red hibiscus *(Hibiscus coccineus)* and crimson-eyed marsh mallow *(Hibiscus moscheutos)*.

Southern sundrops *(Oenothera fruticosa)*

Few perennials are easier to grow and more beautiful than the southern sundrop. It is frequently encountered blooming in late spring on road margins, clearings at edges of woods throughout North Carolina. This carefree native wildflower bears lovely four-petaled blooms. The cup-shaped flowers are a beautiful clear yellow color that complements many other wildflowers. They are clustered at the top of the stems, which grow 1 to 2 feet tall. A distinctive purple red mottling occurs on the stem leaves as well as the evergreen basal leaves. About the only thing that this otherwise agreeable wildflower dislikes is to be planted in soil that is too rich or overfertilized. Southern sundrops are easily propagated either by seed or by division in late fall or early spring.

Blue wild indigo *(Baptisia australis)*

Beautiful flowers, attractive foliage and longevity all recommend this very desirable North Carolina native wildflower. Spikes of bluish purple flowers rise above the foliage and bloom in mid- to late May. Pealike flowers attract the attention of our native bumblebees, which are the primary pollinators of these beautiful blooms. The durable and attractive trifoliate leaves have a definite blue green color. Not only do they make a perfect background for the flowers, but they also give the plant a dense, rounded shape that is very attractive the entire growing season. One of the longest lived of all perennials, blue wild indigo is also one of the easiest to grow. All that it asks is to be planted in a sunny site and be given a year or two to settle in before it returns the favor with beautiful flowers and attractive foliage.

Other garden-worthy Baptisias include white wild indigo *(Baptisia alba)*, yellow wild indigo *(Baptisia spherocarpa)*, and the beautiful hybrid, Baptisia x "Purple Smoke" (a Botanical Garden introduction).

Rough leaf goldenrod *(Solidago rugosa)* "Fireworks"

This stunning fall-blooming perennial was selected and named at the North Carolina Botanical Garden. Refreshingly graceful for a goldenrod, "Fireworks" forms delicate arching sprays of flowers interwoven into a netted yellow dome when it reaches maturity. The general form of this outstanding named variety of goldenrod is reminiscent of the golden spidery arms radiating from exploding aerial fireworks, expressed in delicate flowers rather than sparks. "Fireworks" forms a tight, spreading clump of evergreen foliage that can grow 3 or 4 feet tall. It is one of the most deservedly popular new native selected perennials on the market today. Easy to grow, graceful and very durable, "Fireworks" deserves a place in every sunny fall border.

Other Native Perennials for Sunny Sites

- Appalachian smooth phlox (*Phlox glaberrima* ssp. *Trifolia*)
- Aromatic aster *(Aster oblongifolius)*
- Bear grass *(Yucca filamentosa)*
- Beard tongue (*Penstemon digitalis* "Husker Red")
- Bee balm *(Monarda didyma)*
- Black-eyed Susan (*Rudbeckia fulgida* "Goldstrum")
- Blazing star *(Liatris spicata)*
- Boltonia (*Boltonia asteroides* "Snowbank")
- Climbing aster *(Aster carolinianus)*
- Lance-leaf coreopsis *(Coreopsis lanceolata)*
- Purple coneflower *(Echinacea purpurea)*
- Stoke's aster (*Stokesia laevis* "Omega Skyrocket")
- Summer phlox (*Phlox paniculata* "David" and "Robert Poore")
- Swamp Sunflower *(Helianthus angustifolius)*
- Thread-leaf coreopsis (*Coreopsis verticillata* "Zagreb")

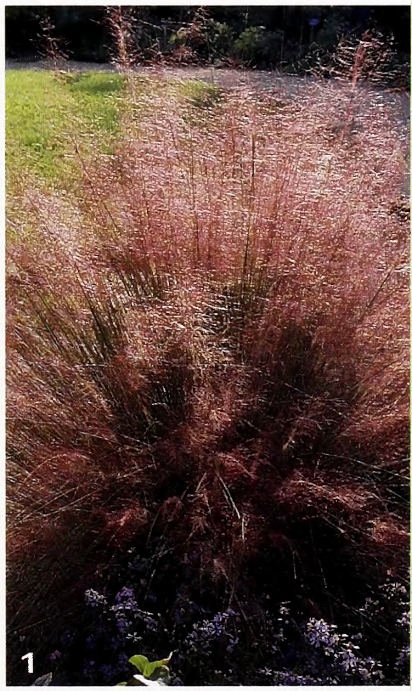
Native Grasses for Sunny Sites

- Bushy bluestem *(Andropogon glomeratus)*
- Hairgrass *(Muhlybergia capillaris)*
- Little bluestem (*Schizachyrium scoparium* "The Blues")
- Switch grass (*Panicum virgatum* "Dallas Blues," "Heavy Metal")

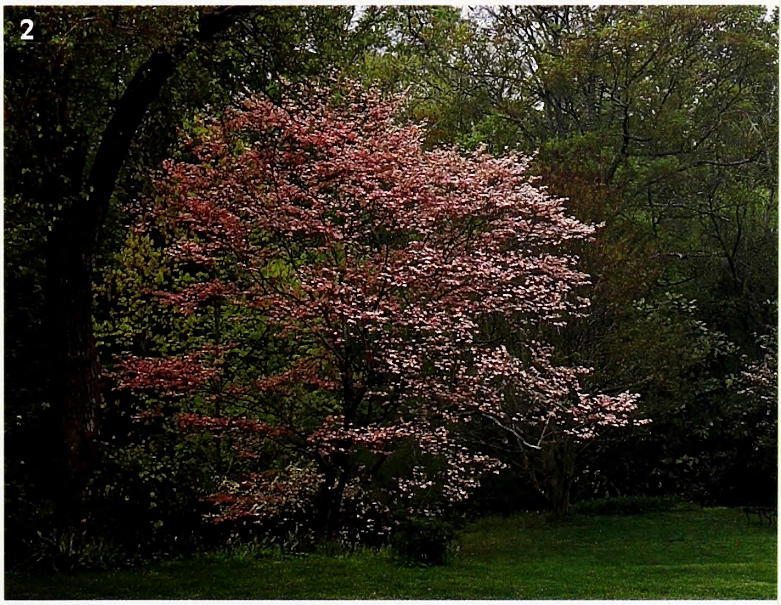
Native Trees and Shrubs for Sunny Sites

- American snowbell *(Styrax americanus)*
- Carolina allspice or sweet shrub (*Calycanthus floridus* "Athens")
- Carolina silverbell *(Halesia carolina)*
- Fringe tree *(Chionanthus virginicus)*
- Highbush blueberry *(Vaccinium corymbosum)*
- Red buckeye *(Aesclus pavia)*
- Swamp haw *(Vaccinium nudum)*
- Sweet pepperbush (*Clethera acuminata* "Hummingbird" and "Ruby Spice")
- Sweetbay magnolia *(Magnolia virginiana)*
- Witch alder *(Fothagilla major)*
- Yellowwood *(Cladrastis lutea)*

ROB GARDNER



1-Hairgrass
2-Pink flowering dogwood



MELISSA McGAW

Selected Sources of Native Plants

Lamtree Farm
2323 Copeland Road
Warrensville, N.C. 28693
Catalog $2
(woody natives)

Native Gardens
5737 Fisher Lane
Greenback, TN 37742
(423) 856-0220
Catalog $2
(native wildflowers and seeds)

Niche Gardens
1111 Dawson Road
Chapel Hill, N.C. 27516
(919) 967-0078
www.nichegdn.com
Catalog $3
(native wildflowers)

Plant Delights Nursery
9241 Sauls Road
Raleigh, N.C. 27603
(919) 772-4794
www.plantdel.com
Catalog $3
(native wildflowers)

Sunlight Gardens
174 Golden Lane
Andersonville, TN 37705
(800) 272-7396
Free catalog
(native wildflowers)

Take-Root Nursery
220 Blakes Dr.
Pittsboro, N.C. 27312
(919) 967-9515
rboyles@interpath.net
(ferns)

We-Du Nurseries
Route 5, Box 724
Marion, N.C. 28752
(828) 738-8300
www.we-du.com
Catalog $2
(native wildflowers, ferns, sedges and woody plants)

Woodlanders
1128 Colleton Ave.
Aiken, S.C. 29801
(803) 648-7522
(native wildflowers, ferns and woody plants)

Other recommended goldenrods include Roan Mountain goldenrod (*Solidago roanensis*), seashore goldenrod (*Solidago sempervirens*), bluestem goldenrod (*Solidago caesia*), and sweet goldenrod (*Solidago odora*).

Butterfly Milkweed *(Asclepias tuberosa)*

Clusters of bright orange flowers bloom on butterfly milkweed in the early summer. This very durable wildflower also attracts monarch butterflies which sip nectar and lay their eggs on the foliage.

Butterfly milkweed is 8 to 12 inches tall and usually has dark green lance-shaped leaves that exude a sticky, milky sap when damaged.

Thick, fleshy roots enable butterfly milkweed to survive dry conditions in the wild, but it is equally at home in the wildflower border. Fleshy roots are an excellent survival strategy for dry sites, but they also make this native wildflower difficult to transplant once established in the garden. It prefers to stay put once planted.

The front of the wildflower border is the best place for this tough and beautiful native. It looks best when grown in combination with thread-leaf coreopsis, Southern sundrops, purple coneflower and lance-leaf coreopsis.

Butterfly milkweed is usually late to start growing in the spring and it is a good idea to mark its location with a stone so as to prevent accidentally digging it up or trying to plant something on top of it.

Where to Buy Native Plants

It is very important to purchase native plants from reputable dealers. Always buy from nurseries that offer propagated native plants; never buy plants that have been collected from the wild. Purchasing wild-collected native plants is bad for the consumer (plants receive rough handling and have almost always been damaged) and for the natural areas from which these plants have been dug. If in doubt about the source of native plants, ask the vendor and let him know that, as a consumer, you do not support collection of native plants from the wild. Be especially wary of trilliums and native orchids that are inexpensively priced; this usually means that they were collected from wild areas. These two groups in particular are difficult to propagate and slow growing. Nursery-grown, ethically propagated plants of these groups are priced accordingly. ⊠

Rob Gardner is a curator with the North Carolina Botanical Garden in Chapel Hill.

ROB GARDNER

1-Red hibiscus
2-Red buckeye
MELISSA McGAW

feminine Wilds

From safety concerns to frustration over waders that don't fit—sporting-minded women face a host of issues that rarely bother a man. These tips will help women set foot confidently into the great outdoors.

written by Carol Marsh ©2000

MIKE MARSH

MIKE MARSH

The date scribbled on the back of the faded photograph was Jan. 7, 1977. The subject of the photo was a red-cheeked young woman (top right). A forced smile on her face was directed at the cameraman. She was sitting, stoop-shouldered, on a wooden plank in a rotting, leaking pit blind and clenching a 20-gauge semiautomatic shotgun. A new camouflage hat was pulled down tight so the earflaps covered most of her long, brown hair. The frayed collar of a drab army field jacket was turned up for warmth against an air temperature of 15 degrees, not counting the chill factor of a 20-knot wind.

That new camo hat was the only purchase I made before my first duck-hunting trip to Bodie Island on North Carolina's Outer Banks. My husband, Mike, and I rummaged through his closet to find anything that would fit me. Unable to find women's outdoor clothing in the local sporting goods store, I was grateful to find a synthetic liner to button inside his ragged military field jacket. He had purchased new insulated waders for himself and given me his old hip boots so I could trudge through the knee-deep waters of the marsh. Looking at the 22-year-old photo, I remember that my feet

KEN TAYLOR

***Women desiring to** be outfitted for a particular sport need look no farther than their local hunting or fishing store. Bryan Carr, owner of The Bowsmithe store, in Dunn, measures the draw length for an aspiring bow huntress. Carol Marsh (below) holds up a striper she landed on a recent outing.*

felt as though they were encased in blocks of ice, while I longed for a flock of pintails to make me forget how cold I was.

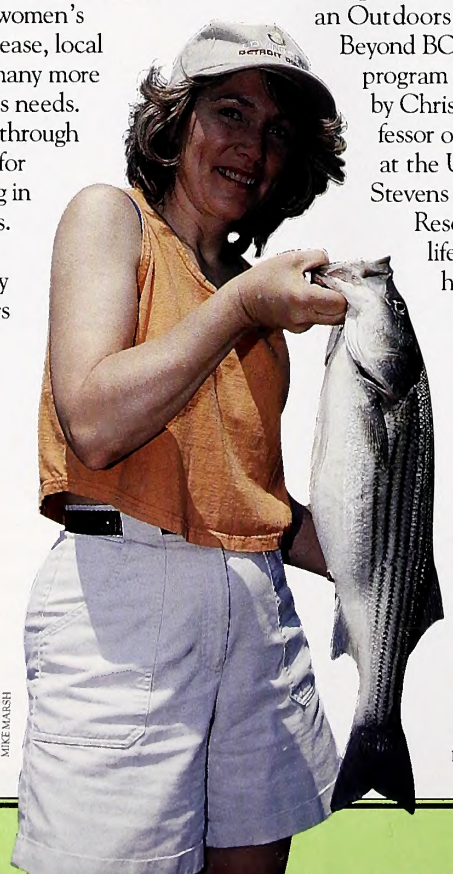
Thankfully, I can now find suitable outdoor clothing in my neighborhood sporting goods store. As the market for women's apparel continues to increase, local shops are now stocking many more items tailored to women's needs. Women can also browse through major outdoor catalogs for waders, boots and clothing in women's shapes and sizes.

The best purchase I ever made to enhance my enjoyment of the outdoors was a pair of high-top leather hunting boots. They fit like gloves and keep my feet warm and dry.

I have found the best source for purchasing equipment, whether a fly-fishing rod or a new deer rifle, is my local sporting goods store—the same one that all the men in my life flock to. Salespeople know my husband and son and also know me by association with them. They know how to determine the draw length of a bow for a woman as well as a man. They generally deal with several different manufacturers and have access to the latest products for women. They know the latest firearm styles designed for women and are happy to give references to local gunsmiths or the lady guide in town who ties the prettiest flies.

Thanks to a growing number of women pursuing outdoor interests, sporting goods manufacturers have begun designing all types of gear for the huntress as well as the hunter.

Aiding this new trend are the Becoming an Outdoors-Woman (BOW) and Beyond BOW programs. The BOW program was developed in 1990 by Christine L. Thomas, a professor of resource management at the University of Wisconsin-Stevens Point College of Natural Resources. The N.C. Wildlife Resources Commission has sponsored the BOW program in North Carolina since 1997. On Aug. 7, 1999 the first N. C. Beyond BOW workshop was held at the Pisgah Center for Wildlife Education.



MIKE MARSH

The BOW program offers a variety of courses to introduce women to pursuits such as rifle marksmanship, archery, fishing, kayaking, canoeing, outdoor survival skills, camping, camp fire cooking, shotgunning and other outdoor-related activities. Women come out of these workshops excited and ready to take the next step with newfound confidence in their skills as outdoor enthusiasts.

Beyond BOW gives women a chance to get together with their peers for one-day workshops aimed at taking their skills to a higher level. For example, those who participated in the Beyond BOW program during August 1999 went fly-fishing for trout on the Davidson River in the Pisgah National Forest. They spent four hours learning about stream ecology and how to tie flies before enjoying another four hours of fly-fishing.

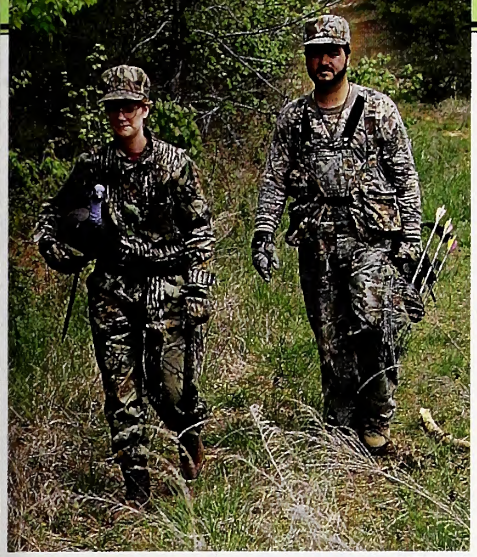
While waiting for an outdoor photography program to start at the 1997 BOW conference, I watched a young woman, named Kathy Smith, waving her arms excitedly after finishing a wild turkey hunting class. She was so excited about learning a new turkey call that she could hardly wait for her next hunt.

Smith's vision was to create the first North Carolina women's chapter of the National Wild Turkey Federation. Her enthusiasm was contagious, drawing in several other attendees including myself, and the Carolina Wild Hens was born. Soon afterward, we booked a quail hunting trip to South Carolina for a weekend of fun at a shooting preserve.

Participating in a BOW workshop is one of many ways women can find female hunting and fishing partners. Local specialty shops hold seminars to teach customers about their products and gear. After being introduced to fly-fishing during a BOW workshop, I attended a fly-fishing class taught by Capt. Sarah Gardner in a Wilmington tackle shop. All of the equipment was furnished, and lunch was provided. I met many other women from my hometown and shared with them the experience of perfecting our fly-casting forms.

An excellent way for women to enjoy the outdoors is to hire a guide. Guides are expert hunters and anglers who will take anyone out on the water or in the woods and teach them how to use specialized equipment and techniques. Outfitters enjoy showing women their unique worlds by canoe or kayak tour on many of North Carolina's rivers and lakes. Most shooting preserves and ranges have instructors who teach ladies how to hit targets or game. Guided services in most parts of the state can usually be found through a quick scan of any outdoor-related magazine.

Guides can also help ease safety concerns. Many women are hesitant to go outdoors without a man as a protector. For years, I tagged along with my husband, hunting for deer, ducks, doves, rabbits, quail as well as fishing for bass and flounder. He knew what to do if my shotgun jammed and



MIKE GADDIS

***Some hunters won't** dare leave their wife at home during hunting season, because she's his best partner. Melanie and Teddy Roberts (shown left) make a formidable team when it's time to go head-to-head with a wily gobbler. Now a seasoned veteran, Carol Marsh (below) poses with a swan she recently brought down.*

how to restart a sputtering outboard motor. I knew if something went wrong he could take care of it. But after attending the BOW workshops, I've learned to master skills such as backing a boat trailer down a boat ramp, which has given me a feeling of self-reliance. Gradually, I'm acquiring the skills to be a part of the team when Mike and I spend a day outdoors.

Even so, I have found there are still men out there who believe loading boats and skinning game are too rugged for women. But I have also met those who welcome me into the group. Once, I helped Mike clean doves while a bunch of guys were standing around. It shamed them into helping out.

Fifteen years ago, my husband took me along to a new deer-hunting camp for the weekend. Those hunters were definitely there to get away from chores and wives. Conversations quieted when I walked into a room, and I felt so uncomfortable that I visited the camp only once.

The hunting club we belong to today also includes mostly men. But in contrast to that camp of long ago, these hunters welcome their wives and girlfriends to join their sport. The men are more excited when a woman bags a deer than when they do. If I don't show up with my husband or son, they ask where I am. After all, I'm now one of the guys.

Reminiscing over some duck-hunting photographs taken in January 1999, I found a picture of the same red-cheeked woman sporting shorter, graying hair. Compared to the photo of 22 years ago, her scowl had turned into a grin. Wearing insulated coveralls tailored to fit, she cradled her favorite 12-gauge, semiautomatic shotgun in excited anticipation of the next flight of teal. Comfortably and confidently, she had become an outdoors woman. ⊠

MIKE MARSH

Contacts for women

KEN TAYLOR

It is easy to find contacts for outdoor supplies for women. Many outdoor events have a list of sponsors who manufacture or sell products. Local sporting goods stores offer a good selection of clothing and products, as well as addresses for catalogs. Outdoors-related internet sites provide an infinite range of sites to browse.

NATIONAL WILD TURKEY FEDERATION:
Carolina Wild Hens Chapter, Kathy Smith
P. O. Box 290 . Red Oak, NC 27868
(252) 937-4351

BOW AND BEYOND BOW:
Cheryl K. West
Youth Services/Outdoor Skills Coordinator
N. C. Becoming an Outdoors-Woman Coordinator
N. C. Beyond BOW Coordinator
1712 Mail Service Center . Raleigh, NC 27699-1712
(919) 733-7123 Ext. 269
E-Mail: west.cheryl@coned.wildlife.state.nc.us

WOMEN'S CLOTHING AND ACCESSORIES:
Tomboy Inc.
E-Mail: itfits@tomboy-womenoutdoors.com
website: www.tomboy-womenoutdoors.com

Cabela's
One Cabela Drive . Sidney, NE 69160
(800) 237-4444
website: www.cabelas.com

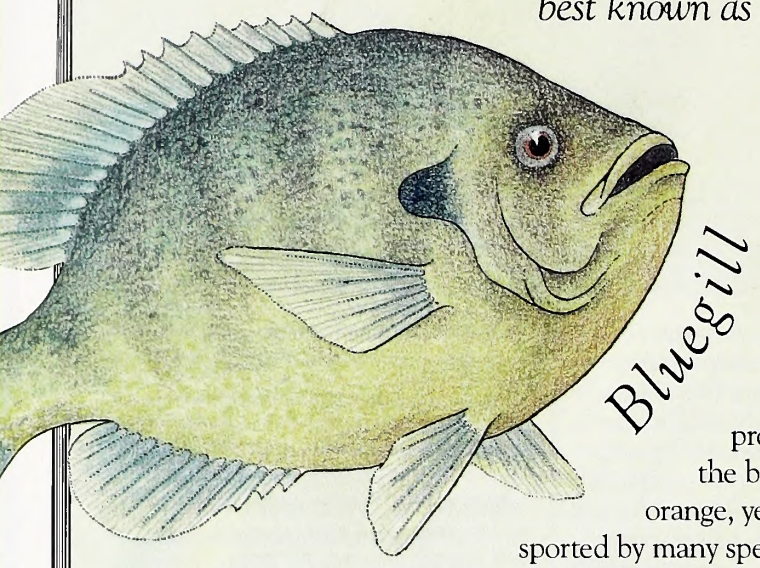
The Orvis Company
1711 Blue Hills Dr. . Roanoke, VA 24012-8613
website: www.orvis.com
(800) 541-3541

Remington Arms Company Inc.
870 Remington Dr.
P. O. Box 700 . Madison, NC 27025
(800) 243-9700
E-Mail: info@remington.com
website: www.remington.com

Picture freshwater fish closely related to sea bass, striped and white bass and perch. Give them deep, ***laterally compressed*** *bodies and two* ***dorsal fins*** *that join and look like a single fin. Add* ***ctenoid*** *scales and you have a family of fish best known as*

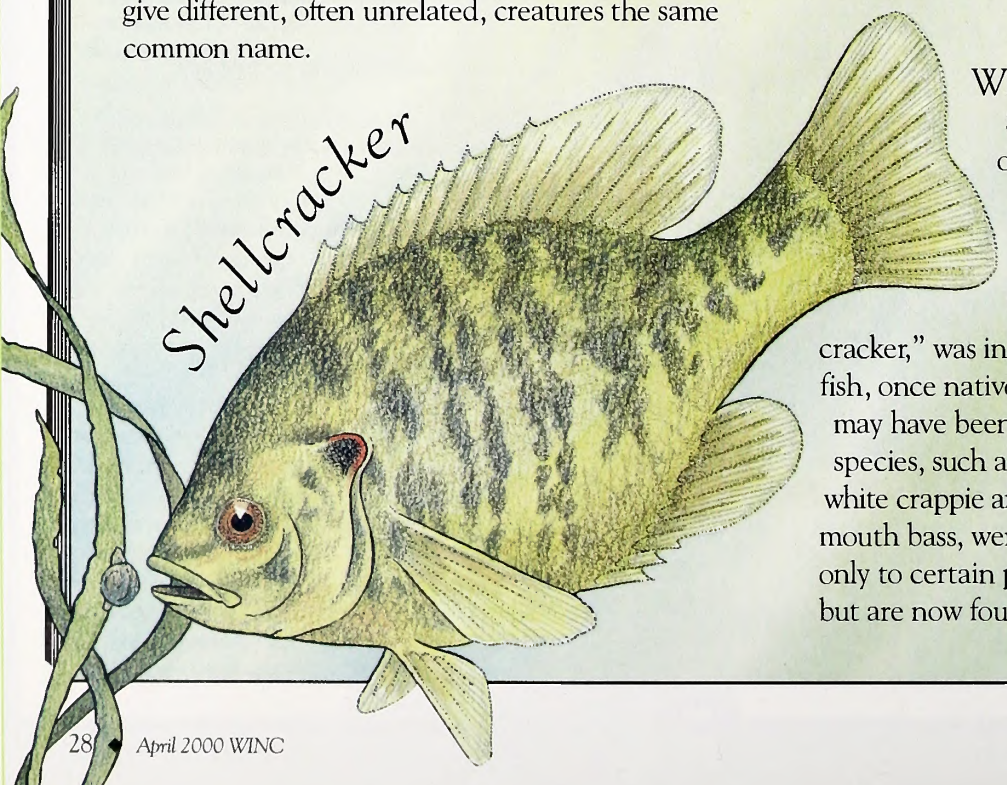
Sunfish

written by Jeff Beane / illustrated by Consie Powell



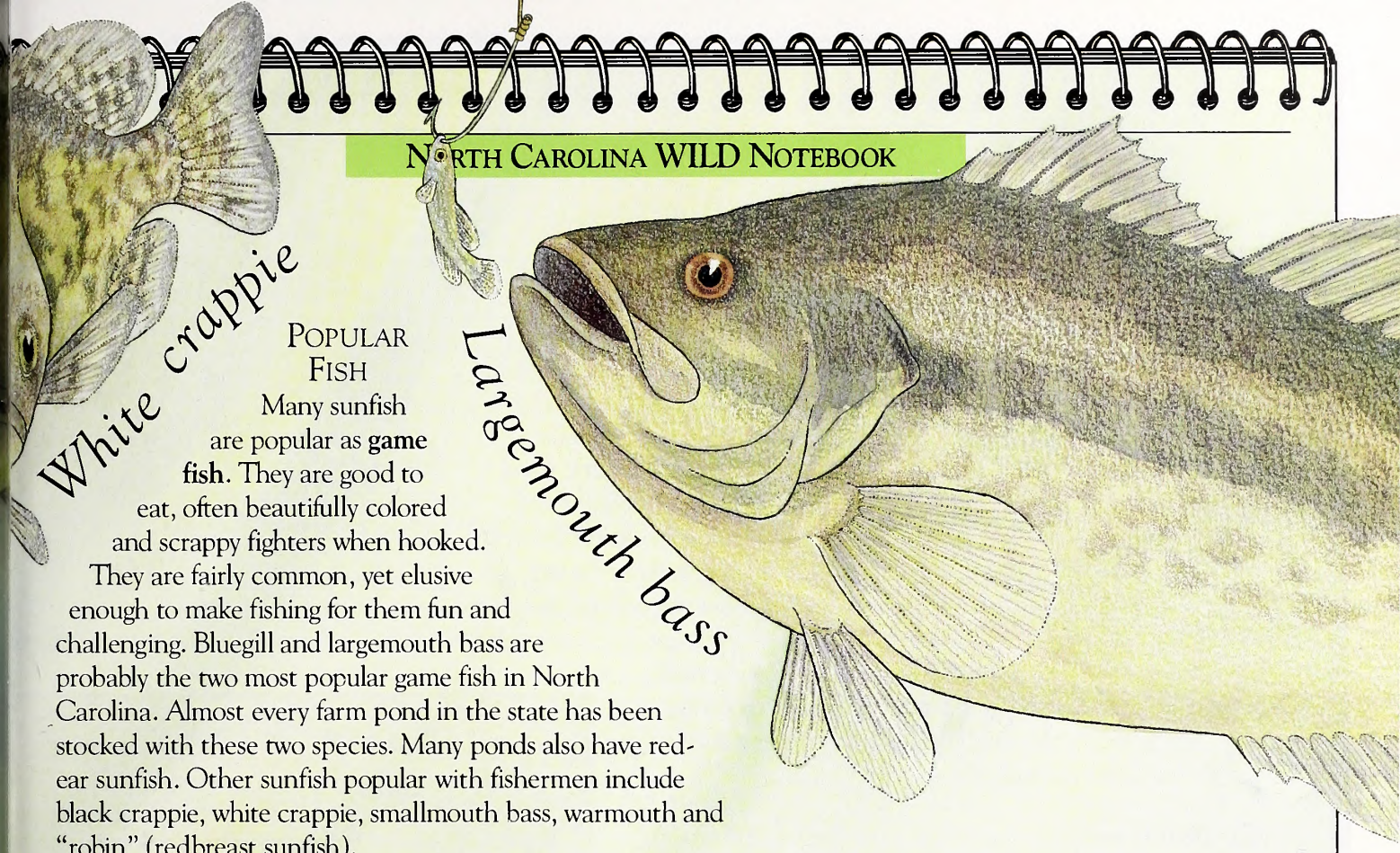
WHAT'S IN A NAME?

The name "sunfish" probably originated from the brilliant shades of red, orange, yellow, blue and green sported by many species. Sunfish are sometimes called "panfish" and many are commonly called bream (pronounced "brim" in most parts of North Carolina), though the true bream is a European fish belonging to a different family. The huge ocean sunfish, or *Mola mola*, also belongs to a different family. Some sunfish (members of the family Centrarchidae) are commonly called "bass" or "perch" though technically they are not; the well-known largemouth bass is really a sunfish. This is one reason why **ichthyologists** use scientific names: it avoids confusion when people give different, often unrelated, creatures the same common name.



WHERE DO SUNFISH LIVE?

Sunfish are native only to the fresh waters of North America, though some species have been introduced elsewhere. Of the 30 species of sunfish, 22 are found in North Carolina. Most are native, but the redear sunfish, or "shellcracker," was introduced, and the longear sunfish, once native to western North Carolina, may have been **extirpated**. Several other species, such as bluegill, green sunfish, white crappie and even the largemouth bass, were originally native only to certain parts of the state but are now found statewide.



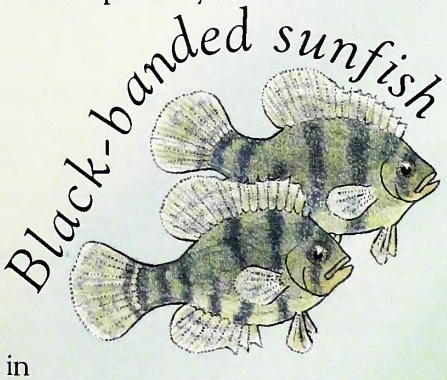
Popular Fish

Many sunfish are popular as **game fish**. They are good to eat, often beautifully colored and scrappy fighters when hooked. They are fairly common, yet elusive enough to make fishing for them fun and challenging. Bluegill and largemouth bass are probably the two most popular game fish in North Carolina. Almost every farm pond in the state has been stocked with these two species. Many ponds also have redear sunfish. Other sunfish popular with fishermen include black crappie, white crappie, smallmouth bass, warmouth and "robin" (redbreast sunfish).

Sunfish Habits

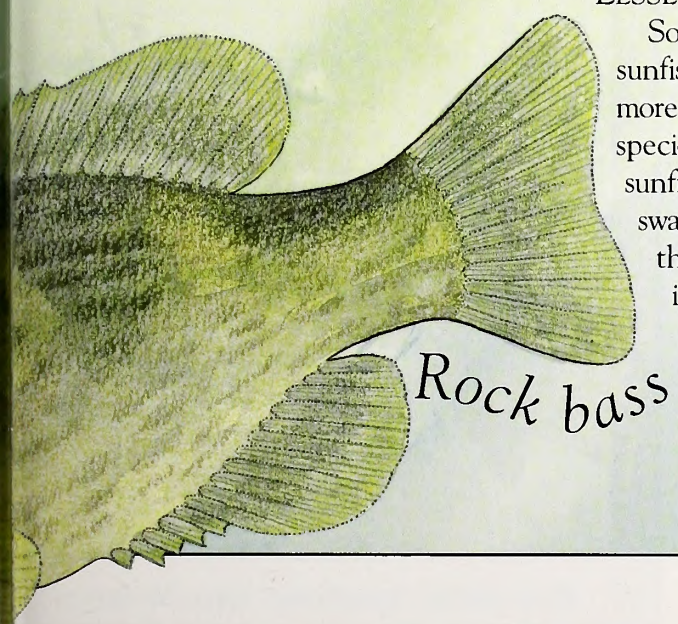
Sunfish are **carnivorous**. Some eat aquatic insects, crustaceans, worms and snails, while others feed mostly on smaller fish. Our largest sunfish, the largemouth bass, eats any animal it can catch and swallow.

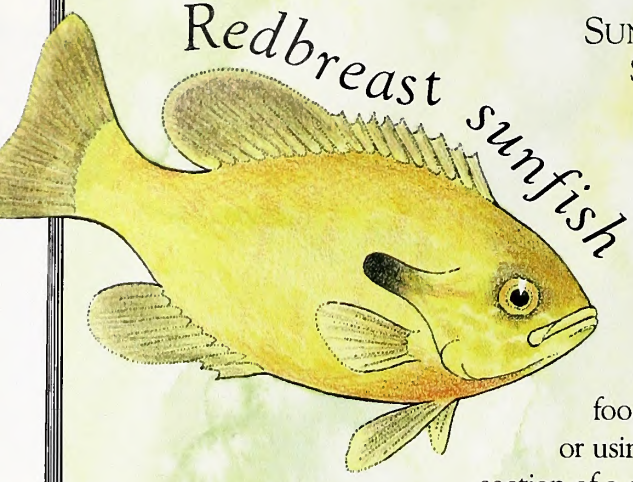
Sunfish have many predators, so they rely on speed, hiding and camouflage for protection. If captured, a sunfish erects its sharp dorsal spines which, along with the round, deep shape of its body, make it a painfully difficult meal to swallow.



Lesser Known Sunfish

Some of our less familiar sunfish include several of the more colorful and interesting species. Spotted sunfish, dollar sunfish and fliers live primarily in swampy ponds and slow streams in the Coastal Plain. Rock bass, spotted bass and redeye bass inhabit larger streams in the Mountains. Roanoke bass live in a few large streams in the Piedmont and Coastal Plain. The pumpkinseed, perhaps our most colorful sunfish, is found statewide. Banded, blue-spotted and black-banded sunfish are too small to be game fish, but are sometimes kept as aquarium pets.





SUNFISH HABITATS

Sunfish live in a variety of freshwater habitats. Most prefer relatively warm, slow-moving water such as lakes, ponds, pools and backwaters. Several species may live in the same pond or stream, but they avoid competition by eating different foods, feeding in different ways, or using different **microhabitats**. In one section of a creek you might find redbreast sunfish in the swiftly flowing water, warmouth and green sunfish in the vegetation along the banks and bluegills, and pumpkinseed in the deep, quiet pools.

What Does It Mean?

laterally compressed: flattened along the sides
dorsal fins: the fins on a fish's back
ctenoid: scales with tiny spines on the exposed surfaces
icthyologists: scientists who study fishes
extirpated: eliminated from, or made to go extinct in, an area
game fish: fish that are commonly caught for food and recreation by fishermen
carnivorous: meat-eating
microhabitat: a specific area within a larger habitat, such a submerged log in a pond or a gravel bed in a stream

Get Outside

Go fishing: If you like to fish, you're in luck. Sunfish can be found in almost every pond, lake, river or large stream in North Carolina. Most are easy to catch and will bite on natural baits as well as artificial lures. You don't need expensive tackle; a cane pole works well for most species.

If you don't like catching fish or baiting hooks, you can still observe wild sunfish. Look for them in the shallow edges of clear lakes and ponds, and in quiet pools in rivers and streams. In clear water, look for the saucer-shaped "beds" that sunfishes make on the bottom. It's fun to watch a sunfish defend its bed against egg-eating intruders.

See sunfish on exhibit: North Carolina's three aquariums (Roanoke Island, Pine Knoll Shores, Fort Fisher) and the North Carolina Zoological Park have exhibits that include several species of live sunfish and are good places to see them up close. The North Carolina Museum of Natural Sciences, which opens its new building this month, will also have live sunfish on exhibit.

Editing and design by Consie Powell. Art puzzle by Anne Marshall Runyon.

One Fish ooo
Sun fish ooooo

How many differences can you

In the pond

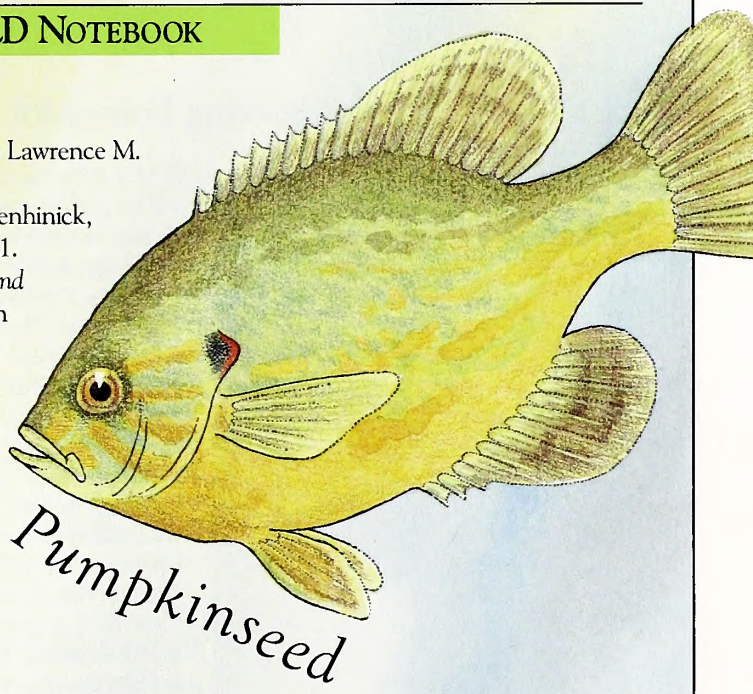
Dollar sunfish, warmouth, green frog

Read and Find Out

- *A Field Guide to Freshwater Fishes, North America North of Mexico* by Lawrence M. Page and Brooks M. Burr, Houghton Mifflin Company, 1991.
- *The Freshwater Fishes of North Carolina* by Edward F. Menhinick, North Carolina Wildlife Resources Commission, 1991.
- *Freshwater Fishes of the Carolinas, Virginia, Maryland, and Delaware* by Fred C. Rohde et al., University of North Carolina Press, 1994.

In *Wildlife in North Carolina*

- "A Case of Piracy" by Lawrence S. Earley, March 1994.
- "The Fish Called Crappie" by Lawrence S. Earley, June 1995.
- "Knowing Your Place" by Lawrence S. Earley, May 1997.
- "The Plentiful Pumpkinseed" by Duane Raver, August 1980.
- "So Many Sunfish" by Eugene Hester, June 1990.

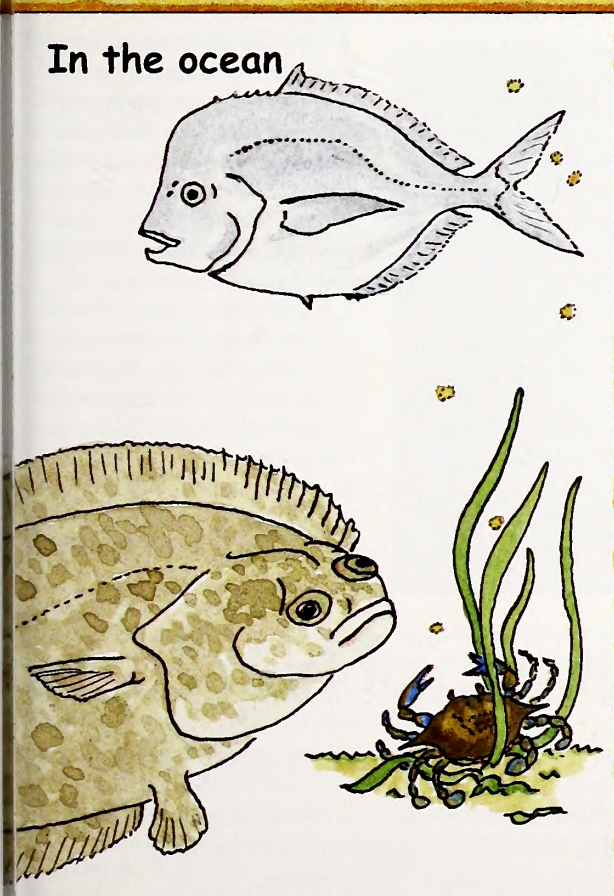


Pumpkinseed

Two Fish
Moon fish

find between the two pictures?

In the ocean



Atlantic moonfish, flounder, blue crab

It's WILD!

Project WILD Activities for teachers and students that correlate to this topic include:

Designing a Habitat: teaches students to identify the components of habitat essential for most aquatic animals to survive.

Fishy Who's Who: teaches students to recognize and identify fish that live in their area and to locate places where the fish occur.

Fashion a Fish: teaches students to describe and understand adaptations of fish to their environments.

Get WILD

Advanced WILD Workshops:

April 7-8 – *Salamanders*, New River State Park. Contact Judy Bumgarner, (828) 262-3185.

April 11-12 – *Black Bears*, Stone Mountain State Park. Contact Edward Farr, (336) 957-8185.

April 13-14 – *Living with Wildlife*, State Forestry Training Center, Crossnore. Contact Anne Hice, (336) 674-6152.

April 21-22 – *Neotropical Migratory Songbirds*, Morrow Mountain State Park, Albemarle. Contact Mel Porter, (704) 982-1523.

May 2-3 – *Field Ecology*, Hanging Rock State Park. Contact Jaye Dow, (336) 593-8480.

May 6-7 – *Migratory Songbirds*, Howell Woods Environmental Learning Center, Four Oaks. Contact Howell Woods, (919) 938-0115.

May 23-24 – *Stream Ecology*, Crowders Mountain State Park. Contact park office, (704) 853-5375.

June 2-3 – *Foxes, Wolves, Coyotes*, SciWorks Environmental Center, Winston-Salem. Contact Kelli Johnson, (336) 767-6730.

June 19-20 – *Mountain Stream Ecology*, Pisgah Center for Wildlife Education. Contact program coordinator, (828) 877-4423.

July 11-12 – *Wildlife Technology*, North Carolina Forest Service Training Center, Crossnore. Contact T.M. Lemon, (336) 957-4382.

North Carolina Poised for Another Record Turkey Season

TERRY SHANKLE

***Wildlife biologists** are predicting another successful season for turkey hunters, as a result of 28 new restoration areas opening in 13 counties for the 2000 season.*

Wildlife biologists are predicting another record turkey harvest for North Carolina, as a result of 28 new restoration areas being opened for hunting in 13 counties for the 2000 gobbler season.

Mike Seamster, wild turkey project leader for the N.C. Wildlife Resources Commission, said North Carolina has set new harvest records in 12 of the past 14 turkey seasons, and this year should be no exception.

"Last year, we had a good hatch across most of the state and, of course, turkey populations are continuing to grow rapidly," Seamster said. "With 28 new restoration areas, if we have good weather during the spring, we should have another record harvest."

During the 1999 season, 5,340 gobblers were harvested statewide, a significant increase from the 4,250 harvested in 1998. The ability of an area to sustain turkey hunting is determined through a system of volunteers who document wild turkey sightings. Property owners near turkey restoration areas are asked to participate in summer brood surveys by reporting any offspring seen accompanying a hen turkey. Also, wildlife enforcement officers, forestry personnel and various others are asked to record the number of turkeys encountered annually. When the number of sightings becomes consistent around a particular area, biologists recommend opening the section to hunting, and the Wildlife Resources Commission makes a final decision.

Because only male gobblers can be harvested, newly opened turkey hunting areas have a good chance of sustaining a turkey population.

"Harvesting one gobbler isn't going to dramatically affect breeding, because another gobbler will breed with multiple hens. Turkeys don't pair for life like some species," Seamster said.

The future is also looking bright for many areas still closed to turkey hunting. A dry 1999 spring and early summer provided for a strong hatch of poults (juvenile birds) which should pay dividends later.

"We had a fairly good hatch this past year, about 2.7 poults per hen," Seamster said. "So increases in turkey numbers are expected."

The Wildlife Commission's long-term goals are to have spring gobbler seasons in every county of the state. Biologists have been able to resurrect the state's turkey population from a mere 2,000 in 1970 to more than 100,000 today. During the past three decades, well over 5,300 birds have been released on more than 350 restoration sites across the state. Thanks to the dedication of wildlife biologists and the support of sportsmen, wild turkeys now exist in all of the state's 100 counties.

—Chris Powell

New Turkey Hunting Areas

The remainder of the following counties will be opened for the 2000 turkey season: Anson, Chowan and Craven. The counties that will open entirely are: Duplin, Gaston, Lenoir and Washington. The counties containing partial openings are: Camden, Currituck, Moore, Perquimans, Stanly and Union.

For a complete listing of all legal turkey-hunting areas, see page 37 of the *1999-2000 North Carolina Inland Fishing, Hunting & Trapping Regulations Digest*.

Edited by Chris Powell

Got a Gobbler?

Call **1-800-I-GOT-ONE** to report a turkey harvest.

All bearded birds harvested during the 2000 turkey season must be reported either through a cooperator agent or via the toll-free telephone reporting system.

Registration Opens for Fur, Fish 'n Game Camps

Registration is now open for boys and girls ages 12-15, who wish to participate in the 1999 Fur, Fish 'n Game Rendezvous Camps. The registration fee is $260 per camper, and registration forms can be obtained by calling (919) 515-3244 or (919) 515-7812 or contacting your local county cooperative Extension Service center.

Held June 11-16, the regular and advanced camps will each be open to the first 30 respondents. The regular camp will be limited to 85 campers, and the advanced camp will be limited to 20 campers. Both camps will be held at the Millstone 4-H Center, located in the Sandhills Game Land of Richmond County.

Accredited by the American Camping Association, the Millstone 4-H Center provides trained camp counselors with class instruction handled by a variety of professional natural resource managers and educators.

First-time participants will study wildlife and aquatic biology, earn a Hunter Education Certification, learn about firearm safety and be involved in numerous recreational activities.

Children who've already participated in a Fur Fish 'n Game camp will qualify for the Outdoor Resources Career Camp (advanced camp). Advanced campers will learn about prescribed burning, wildlife surveys, estimating timber value, dendrology, animal damage control and endangered species management.

The camp is sponsored by the N.C. Cooperative Extension Service, N.C. Wildlife Federation, N.C. Wildlife Resources Commission, N.C. Bow Hunters Association and the Wake County Wildlife Club.

—Courtesy of the N.C. State University Forestry Extension Department

Wildlife Commission Expands Striper Fishing on the Roanoke River

Roanoke River striped bass anglers will receive an extra day of fishing per week as well as a harvest-quota increase of almost 43,000 pounds for the 2000 striper season.

Pete Kornegay, coastal region fishery coordinator for the North Carolina Wildlife Resources Commission, said the overall health of the Roanoke River striped bass fishery has allowed last year's 69,700-pound quota of striped bass to be increased to 112,500 pounds for 2000.

"From our yearly evaluation of data on striped bass catch, abundance and reproduction, it's apparent that the Roanoke River/Albemarle Sound striped bass population continued to grow," Kornegay said. "We're confident that harvest of stripers can now be significantly increased."

The striped bass season on the Roanoke River will open March 15 and will be closed by proclamation when 112,500 pounds of stripers are caught. Until the season is closed, stripers may be harvested on Tuesdays, Wednesdays, Saturdays and Sundays in the Roanoke River Management Area, which includes the Roanoke, Cashie, Eastmost and Middle rivers as well as their tributaries.

As in previous years, anglers can keep three fish per day on the open fishing days, with a minimum size limit of 18 inches. Between the April 1 to May 31 spawning period, no stripers between 22 and 27 inches may be retained on the Roanoke River.

Also, a regulation to protect spawning stripers will remain in effect this year. Only single, barbless hooks can be used from April 1 through June 30 in the waters of the Roanoke River upstream of U.S. 258. This legal requirement can also be met by crimping down the barb of each hook with pliers.

Though the spring striper season on the Roanoke River will be closed when the quota is met, catch-and-release fishing remains a viable option through June. Because so many spawning fish will be caught, it is important that all stripers be handled gently and released as quickly as possible.

MELISSA McGAW

***A healthy Roanoke River** striper fishery will allow for an extra day of striper fishing per week for the 2000 season. The season will open March 15 and will be closed when 112,500 pounds of stripers are caught.*

Anglers are encouraged to use barbless, wire hooks rather than stainless steel hooks when fishing for stripers for fun. Also, fishermen should avoid touching the fish with dry hands or using a towel for a better grip. If possible, fish should be released while still in the water. For deeply hooked fish, the line should be cut as close to the eye of the hook as possible before releasing the fish. This will allow the hook to dissolve inside the striper.

Following a decade-long recovery effort, the Roanoke River/Albemarle Sound striper population was declared recovered in 1997 by the Atlantic States Marine Fisheries Commission.

Future harvest levels of stripers in the Roanoke River and Albemarle Sound will depend upon continued health of the population.

"The effects of poor water quality in coastal North Carolina sounds and rivers caused by the 1999 hurricanes are currently unknown," Kornegay said. "We will be closely monitoring these fish to detect changes in population trends."

—Chris Powell

Anglers Get Recognition

Now in its fourth year, the N.C. Angler Recognition Program (NCARP) is continuing to recognize anglers who catch fish reaching minimum standards established by the Inland Fisheries Division of the N.C. Wildlife Resources Commission.

Based on the honor system, fishermen simply measure the fish or weigh it on a pair of hand scales. If the fish is a trophy, it can be kept or released. Anglers who land qualifying fish can receive a colorful certificate, which includes the details of their catch, and an artist's illustration of the particular species.

Bob Curry, program manager for the Fisheries Division, said that besides recognizing significant catches, the program also provides biologists with additional data on specific game fish species.

"Since the program started, the Division of Inland Fisheries has issued 884 certificates and 19 Master Angler citations," Curry said. "This information enables our biologists to track catches of quality-size fish and monitor trends in fisheries populations."

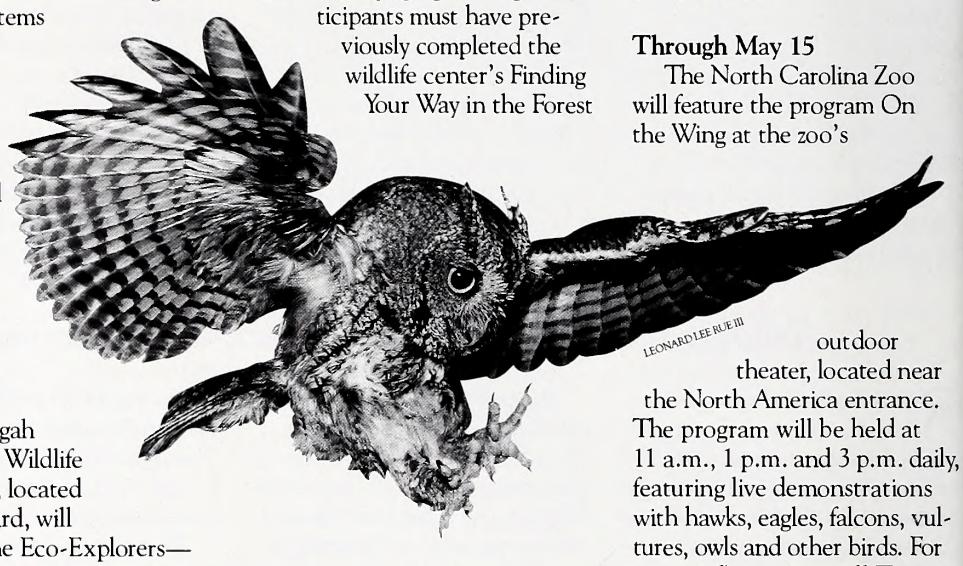
The Angler Recognition Program shouldn't be confused with the State Record Fish Program, which certifies the largest fish caught in the state. This program requires more stringent guidelines including the use of certified scales and witnesses.

To apply for an NCARP certificate, use the appropriate form on page 29 of the current *Regulations Digest*. Don't forget to send in $5 for processing.

—*Chris Powell*

North Carolina Outdoor Calendar of Events

On several occasions, events in this calendar have been changed without notice. Readers should check with the contact listed before traveling to an event. Items for listing should be conservation oriented and should be sent at least four months in advance.


LEONARD LEE RUE III

April 13, 14, 22

The Pisgah Center for Wildlife Education, located near Brevard, will conduct the Eco-Explorers—Earth Day program from 9 to 11 a.m. Designed for children ages 8 to 13, this program features an eco-investigation that engages children with the natural world. For more information, call (828) 877-4423.

April 15

The Pisgah Center for Wildlife Education, located near Brevard, will conduct the Using a Map and Compass program from 1 to 4:30 p.m. Designed for children ages 16 and up, this hands-on, advanced program will integrate the use of a compass and topographic map. Participants must have previously completed the wildlife center's Finding Your Way in the Forest program. For more information, call (828) 877-4423.

April 29

The Pisgah Center for Wildlife Education, located near Brevard, will conduct the Under the Looking Glass program from 1:30 to 4:30 p.m. This hands-on program focuses on the collection and identification of microscopic plants and animals from streams around the wildlife center. This course is designed for participants ages 12 and up. For more information, call (828) 877-4423.

Through May 15

The North Carolina Zoo will feature the program On the Wing at the zoo's outdoor theater, located near the North America entrance. The program will be held at 11 a.m., 1 p.m. and 3 p.m. daily, featuring live demonstrations with hawks, eagles, falcons, vultures, owls and other birds. For more information, call Tom Gillespie at (336) 879-7202.

May 1-2

The North Carolina Herpetological Society will hold its annual spring meeting at Appalachian State University in Boone. Anyone with an interest in reptiles or amphibians is welcome to attend. For more information, call Jeff Beane at (919) 733-7450 Ext. 754.

On Patrol

Editor's note: *While most North Carolina sportsmen are law abiding, a few are not. Listed below is a report of one wildlife violation that exemplifies the humorous situations our North Carolina wildlife enforcement officers encounter while on patrol.*

Wildlife officers Joey A. Williams and Kenneth Osborne recently stopped to check three men fishing from a boat on Lake Hickory in Alexander County. Pulling up to the craft, both officers noticed a strong smell of marijuana, which prompted a line of questioning. One man quickly produced a bag of marijuana from a cassette tape case. Noticing a bulge in the pocket of the second man, the wildlife officers questioned him as well, which led to the discovery of another bag of marijuana. The third man stood up and, while attempting to dig something out of his pants, went overboard. Having seen this before, the officers pulled the man in after he emerged, then patiently watched the surface of the water. A few moments later, a small plastic bag floated to the top. Guess what it also contained?

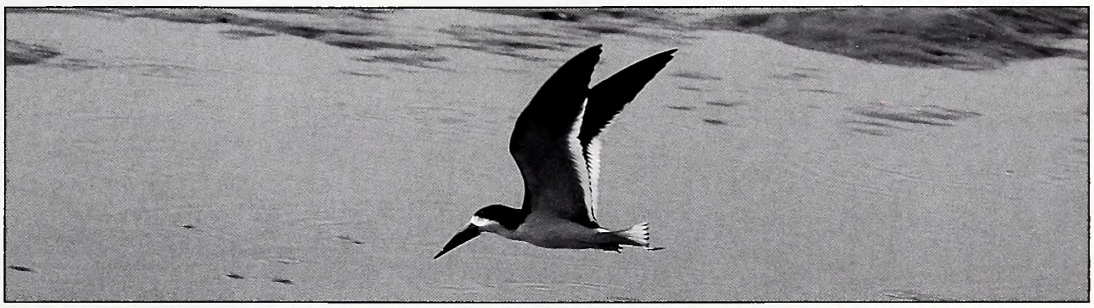
Eight Species of Colonial Waterbirds Believed to Be Declining

A recent survey of colonial waterbirds along North Carolina's coast has revealed an apparent decline among eight species.

David Allen, coastal nongame project leader for the N.C. Wildlife Resources Commission, said the waterbirds of concern include the black skimmer, gull-billed tern, Forster's terns, black-crowned night heron, glossy ibis, tricolored heron, snowy egret and the common tern.

"Most species of colonial nesters are faring well," Allen said, "but we have noticed a decline in these eight particular species."

The decline is largely due to the rapid development of coastal areas which has caused the stabilization of beaches, Allen said. Most of these waterbirds need habitat consisting of sandy-shell beach areas with little or no vegetation. This type of habitat historically has been created by ocean overwash that knocks down dunes and pushes sand and shell onto the beach.



LAWRENCE S. EARLEY

***Loss of habitat is believed to be the cause of** the decline of the black skimmer (above) and seven other species of colonial waterbirds along North Carolina's coast.*

"The most serious decline has occurred in common terns," Allen said. "We had 4,885 nesting pairs in 1977 but only 888 pairs in 1999. Also, gull-billed tern-nesting numbers have dropped from 621 to just 154 during the same 22-year period. And black skimmer nests have dropped from 1,925 to 679."

While there are no simple solutions to providing the habitat needed to reverse these trends, there are things individuals can do to give colonial waterbirds a helping hand.

"The most obvious thing is that if you see a posted area for nesting birds, stay out of that area," Allen said. "Also, don't let your cats run free on the beach and keep dogs on a leash."

Once every two years, Wildlife Commission biologists and other personnel perform waterbird surveys between April and July. The participants line up about 10 feet apart and walk across an area, counting nests and the presence of adults, eggs or chicks. During the 1999 survey, a total of 78 colonies of colonial waterbirds were found in the estuaries and barrier beaches of North Carolina. These sites contained 56,689 nests of 23 different species.

—Chris Powell

Field Notes

Wild Turkey (bearded birds only)	April 8-May 6
Hatchery-Supported Trout Waters	April 1-June 30
Wild Trout Waters	Year-Round

Information on bag limits and other regulations may be found in the *1999-2000 North Carolina Inland Fishing, Hunting & Trapping Regulations Digest*. For a copy, check with license agents or contact the N.C. Wildlife Resources Commission at (919) 733-7291.

Fishery Biologist of the Year

RODNEY FOUSHEE

***James W. "Pete" Kornegay (right),** the Wildlife Commission's coastal fishery research coordinator, was chosen as the Fishery Biologist of the Year at the Southeastern Association of Fish and Wildlife Agencies' annual conference held recently in Greensboro. The association is made up of wildlife agencies from 17 states. Kornegay was selected for his leadership in the recovery of the striped bass on the Roanoke River. Pete Bromley, a wildlife professor at N.C. State University, was also on hand for the award presentation.*

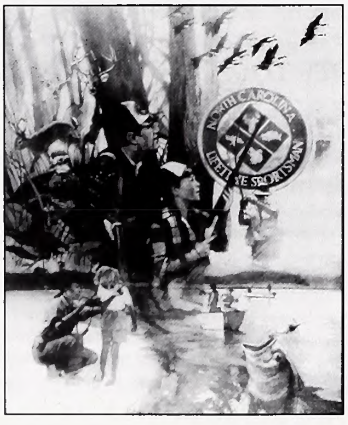
Catch Us at These Numbers

- **1-800-662-7137** to report violations of hunting and fishing laws.
- **1-800-628-3773** (NC VESSEL) for boat registration and titling.
- **1-800-675-0263** for hunting dates and shooting hours for migratory game birds.
- **1-888-248-6834** (2HUNTFISH) to purchase most licenses with VISA or MasterCard using a touch-tone telephone.
- **1-800-446-8663** (I GOT ONE) to report big game harvests.
- Connect to the Commission's online web site at **http://www.state.nc.us/Wildlife/**

The N.C. Wildlife Resources Commission maintains five toll-free telephone numbers to provide better services and convenient access to information for North Carolina citizens. Calls are answered in order, but some numbers may require a wait during busy seasons.

VISA MasterCard

Wildlife Endowment Fund Report



Totals Through January 2000

Principal Balance
$29,631,600.94

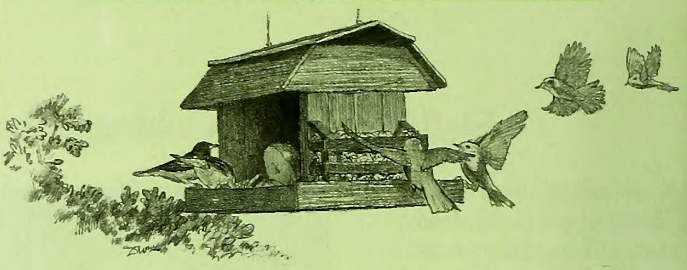
Interest Earned
$29,767,794.50

Total Receipts
$59,399,395.44

Interest Used
$18,330,819.04

Fund Balance
$41,068,576.40

Established on May 29, 1981, this fund is derived from the sale of lifetime hunting and fishing licenses and lifetime subscriptions to *Wildlife in North Carolina* magazine as well as from tax deductible contributions. While the interest may be used to supplement N.C. Wildlife Resources Commission programs, the principal remains invested to generate additional interest for the future.



Simple Solutions

by Rodney Foushee

Ah, the arrival of spring signals the return of many of our feathered friends. With feeders loaded with fresh seed and birdhouses spruced up for spring nesting, we think we're ready for anything. However, it never fails that Mother Nature throws us a few unexpected curveballs. Here are some simple solutions to the most common backyard birding problems.

Window Collisions: Songbirds run into windows for two main reasons: 1) Fleeing predators from a feeding station and 2) attacking their own reflections. To prevent collisions, make sure your feeder is either very close to a window or a good distance away from it. To discourage aggressive birds—especially male cardinals—from attacking their reflections, break up the image with a sun catcher, or attach small post-it notes inside the pane.

Missing Eggs: If you suddenly discover your prized bluebird eggs have vanished from their box, chances are you've had a visit from a black rat snake. The best solution is to install a cone-shaped, metal predator guard below the nesting box and at least 4 feet off the ground.

Chewed Entrance Hole: Has some mysterious creature furiously worked to enlarge the entrance hole to a bird nesting box? This is a good sign that a rodent—either a gray squirrel or flying squirrel—has been busy wearing down its teeth on the soft wood. Your best bet is to nail a metal plate with a hole cut in it over the entrance hole. These excluder plates are available at birding supply centers.

Unwanted Guests: Are titmice or chickadees taking up residence in a box intended for bluebirds? It's too late to do anything this season, but once the new arrivals have moved out, go ahead and move the bluebird box to a more open location. And make sure the entrance hole faces an open area such as a field or yard.

Avoiding Ambushes: Are cats and hawks making easy pickings of your backyard visitors? You can give songbirds a fighting chance by placing your feeders within 10 to 12 feet of good escape cover such as shrubs and bushes.

Squirrel Raiders: Though many manufacturers claim otherwise, there is no such thing as a "squirrel-proof" bird feeder. If squirrels are raiding your feeders, you can discourage them by lacing your seed with capsicin, a substance found in hot peppers. (Harmless pretreated "Squirrel-Away" seed is also readily available.) Or better yet, create a separate squirrel feeding station in your yard where you can keep bushytails content with inexpensive dried corn.

N.C. WILD STORE

RARE HABITATS

water-quality issues

Indian remains

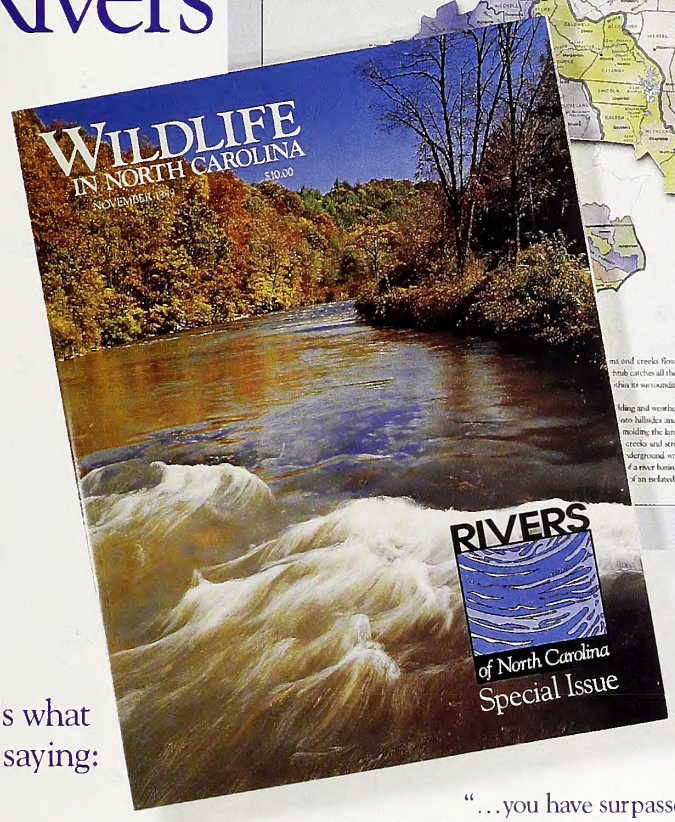
early explorers

the secret life of animals

canoe trips

the real-life stories of people working to clean our rivers

A Time *for* Rivers



You'll experience all of these and much more in "The Rivers of North Carolina," a 128-page special issue of *Wildlife in North Carolina*. For timely coverage of all of North Carolina's river basins, as well as eye-catching photos and educational maps and graphics, there's nothing else like it on bookshelves anywhere.

Here's what they're saying:

"...you have surpassed yourself with this issue. The art is not just beautiful but illustrative and informative; the photos and charts and sketches of the river basins are put together with a wonderful sense of composition to enhance the articles. ["Rivers of North Carolina"] is a classic."
—Philip Gerard, author of *Cape Fear Rising*

"With excellent writing, photos, and maps, the [special issue] is a beautiful gift to all of us, as well as a wonderful teaching tool for all ages. What a great way to bring in the Year of the Rivers - 2000 celebration!"
—Peg Jones, executive director, North Carolina Watershed Coalition

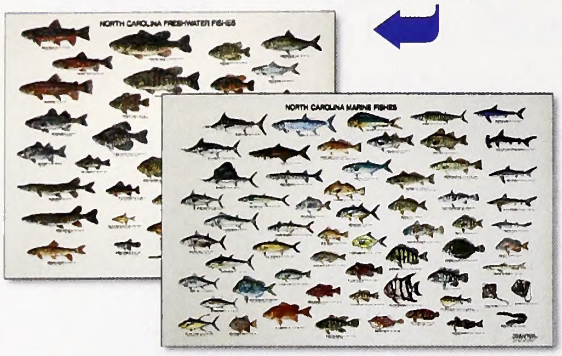
Order "Rivers of North Carolina" today for your own bookshelf, or give it to friends and family members to enjoy. For $10, plus shipping and postage, you'll have a coffee-table edition that's already being hailed as a classic.

Item Code M11 $10

All proceeds from the sale of these products support the development and production of conservation education projects and programs.

N.C. WILD STORE

North Carolina's freshwater fish and marine fish are colorfully displayed on individual posters, and feature the art of Duane Raver. Reel yours in today!



Fishes of North Carolina

Set of 2. Freshwater fish poster shows 36 state species (size 28" x 22 1/2"). Marine fish poster shows 60 species (size 35" x 22 1/2") $10.

ITEM CODE **P9**

Nature's Ways Collection

Explore the wonders of the natural world, wildlife species and ecosystems through "Nature's Ways." More than 200 essays from *Wildlife in North Carolina* have been compiled in a beautiful 6-volume paperback set. $27.50.

ITEM CODE **M9**

Also available as a boxed set. $30.

ITEM CODE **M10**

Before going on your next outdoor hike or camping trip, be sure you know North Carolina's reptiles.

Reptiles of North Carolina

Set of 4 posters in full color. Each poster decribes the species and denotes which reptiles are on the endangered, protected or special concern list. A set includes: lizards, turtles, and both live-bearing snakes and egg-laying snakes. Posters are sized 22" x 34". $18. ITEM CODE **P10**

Amphibians of North Carolina

The Hylid Frogs. North Carolina's tree frogs, cricket frogs and chorus frogs, belonging to the large family *Hylidae*, are presented in this colorful poster, one of two frog posters in the Amphibians series. 22" x 34". $6.

ITEM CODE **P11**

Amphibians of North Carolina

True Frogs and Toads. The second poster in the Amphibians series showcases true frogs and toads. Vibrant photos combine with informative text to make it a standout in the classroom or at home. 22" x 34". $6.

ITEM CODE **P14**

Waterfowl Decoys of N.C.

Nineteen classic waterfowl decoys from North Carolina's legendary days of waterfowl hunting have been collected for the first time on this framable, high-quality poster. This is the first in a series of "Sporting Heritage" posters. 22" x 34". $10.

ITEM CODE **P12**

Traditional Trout Flies of the Southern Appalachians

Sixteen traditional trout flies are presented in stunning color detail. Each fly is accompanied by a brief history of its development and use in Appalachian waters as well as the components that make up each hand-tied creation. Second in a series of "Sporting Heritage" posters. 22" x 34". $10. ITEM CODE **P13**

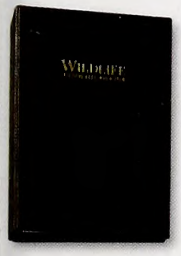
Bird Houses & Feeders: How to Build and Enjoy Them

An eight-page illustrated guide to building bird houses and feeders. $2.

ITEM CODE **M6**

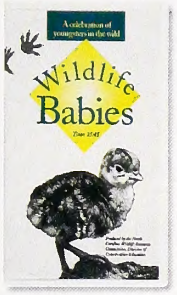
Dogs that Point, Fish that Bite

Here are 50 of the best "Our Natural Heritage" columns written by Jim Dean for *Wildlife in North Carolina* over the past 17 years. Published by the University of North Carolina Press and the N.C. Wildlife Resources Commission. Hardbound. 220 pages. $19.95. ITEM CODE M8



Magazine Binder

Store 12 issues of *Wildlife in North Carolina* in a sturdy binder. $10.
ITEM CODE M2



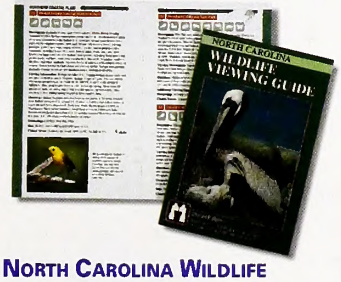
Wildlife Babies Video

Entertaining 25-minute video version of the classic 1965 Jack Dermid film reveals springtime antics of young wood ducks, black bear, possums, cottontails and others . $20.
ITEM CODE N9

Based on Chief Seattle's 1855 speech, the film's focus is on environmental ethics. Accompanied by This Land Is Sacred, this film is a must-see for everyone. It is destined to become a classic.

All Things Are Connected

Video and Activity Guide. $22.
ITEM CODE W3



North Carolina Wildlife Viewing Guide

From Cape Hatteras to the Great Smokies, *North Carolina Wildlife Viewing Guide* will lead you to 90 of the state's premier wildlife viewing locations—and better your chances of seeing wildlife once you get there. $5.95. ITEM CODE N6

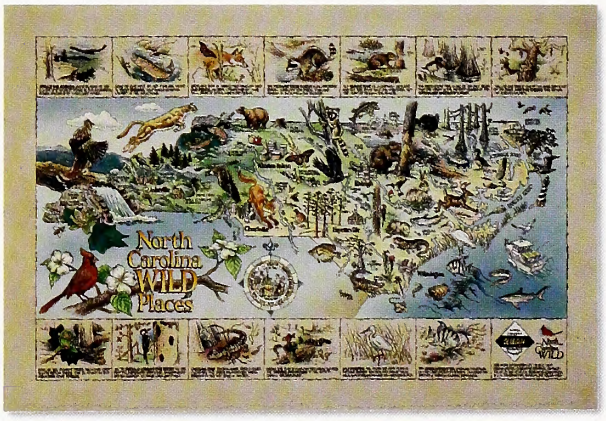
Gardens for Butterflies

Article reprint from *Wildlife in North Carolina* magazine for the gardener who wants to attract some of nature's most colorful creatures. $2. ITEM CODE M5

Scouting Correlations

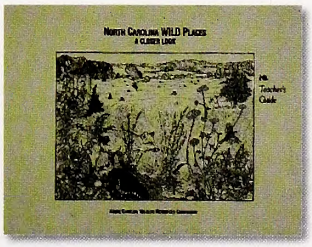
Cub, Boy and Girl Scout requirements are correlated to Project WILD and Aquatic WILD activities. Supplements Scout leaders' planning materials and events. Each $3.
Cub & Boy Scout Correlation. ITEM CODE E9
Girl Scout Correlation. ITEM CODE E10

North Carolina's wildlife habitats come alive in this 82-page, easy-to-read, soft cover book. With delightful illustrations by Anne Marshall Runyon, N.C. WILD Places covers 13 habitats across the state.



North Carolina WILD Places: A Closer Look

Book and Posters Set. With each book you'll receive two habitat posters (also by Runyon) and a N.C. WILD Places Map poster, featuring the art of Jackie Pittman. $16. ITEM CODE E6



North Carolina WILD Places Teacher's Guide

For teachers using *North Carolina WILD Places* in the classroom, these activities and games will heighten student awareness of wildlife habitats. $6.
ITEM CODE E7

More terrific items ☛

N.C. WILD STORE

Top-quality, 3-ring binder holds 120 WILDlife Profiles. Custom-made binder comes with a table of contents, tab dividers to organize Profiles by classes, an index and 120 fact sheets.

WILDlife Profiles Binder & WILDlife Profiles Sets 1-12

Binder features clear overlay cover, 1½" capacity and inside literature pockets. See the list of species profiled below. **$30.** ITEM CODE **W17**

Set 1. Black bear, raccoon, white-tailed deer, striped skunk, bobwhite quail, wild boar, muskrat, mourning dove, coyote, mallard.

Set 2. Mink, canvasback duck, red fox, wild turkey, beaver, American river otter, Canada goose, bobcat, red wolf, cougar.

Set 3. Humpback whale, black duck, osprey, clapper rail, red-shouldered hawk, cottonmouth, diamondback terrapin, largemouth bass, black crappie, channel bass.

Set 4. Brook trout, garden spider, Tar spiny mussel, wood duck, bullfrog, mayfly, tiger salamander, bog turtle, hellbender, shortnose sturgeon.

Set 5. Cottontail rabbit, gray squirrel, northern flying squirrel, newt, common crow, red-tailed hawk, prothonotary warbler, bluegill, striped bass, Eastern oyster.

Set 6. Opossum, peregrine falcon, Eastern bluebird, American toad, rat snake, Eastern glass lizard, smallmouth bass, brown trout, monarch butterfly, Virginia big-eared bat.

Set 7. Chipmunk, gray fox, bald eagle, loggerhead shrike, common snapping turtle, five-lined skink, bluefish, rainbow trout, grasshopper, horseshoe crab.

Set 8. Appalachian cottontail, manatee, barred owl, turkey vulture, Neuse River waterdog, spring peeper, coral snake, American alligator, American eel, American shad.

Set 9. Southern flying squirrel, fox squirrel, great horned owl, snowy egret, Southern leopard frog, corn snake, Atlantic sturgeon, walleye, luna moth, crayfish.

Set 10. Marsh rabbit, woodchuck, hooded warbler, whippoorwill, green salamander, copperhead, fence lizard, muskellunge, chain pickerel, Scotch bonnet.

Set 11. Atlantic croaker, Southern flounder, summer flounder, spot, king mackerel, Spanish mackerel, sea mullet, weakfish, spotted seatrout, striped mullet.

Set 12. Bay scallop, black sea bass, blue crab, brown shrimp, spiny dogfish and smooth dogfish, gag, hard clam, menhaden, sandbar shark, white perch.

Embroidered Caps

North Carolina WILD Cap. N.C. Wild cardinal on brushed-cotton twill cap with a Velcro® closure. Two-tone cap is tan/forest green. **$16.50.** ITEM CODE **A1**

Wildlife in North Carolina Caps. Exclusive designs and magazine logo are featured on three different cap styles. **$16.50 each.**

- Brook trout on sage-colored, brushed cotton cap with an unstructured front, extended bill, and nubuck suede closure. ITEM CODE **A3**
- Deer silhouette on Advantage® Camouflage cotton cap with tan suede bill. ITEM CODE **A6**
- Deer silhouette on blaze orange cap with brown waxcloth bill. ITEM CODE **A7**

Pisgah Center for Wildlife Education T-shirt

100% cotton natural color tee with design on back and Pisgah logo on front. **$14.50.**
ITEM CODES:
A8MED (medium)
A8LRG (large)
A8XLG (extra large)
A8XXL (extra extra large)

New: WEE TEES

Just like the adult shirt with Pisgah design, only smaller.
ITEM CODES:
A9XS (extra small; size 2-4) **$10.**
A9SM (small; size 6-8) **$12.50.**
A9MD (medium; size 10-12) **$12.50**
A9LG (large; size 14-16) **$12.50.**

Wildlife in N.C. T-shirt

WINC magazine logo on front pocket. Tundra swan art on back. White. **$14.50.** ITEM CODES:
A5MED (medium)
A5LRG (large)
A5XLG (extra large)
A5XXL (extra extra large)

N.C. WILD T-shirt

N.C. WILD logo printed on front and colorful art on back. White. **$14.50.** ITEM CODES:
A4MED (medium)
A4LRG (large)
A4XLG (extra large)
A4XXL (extra extra large)

WILDLIFE COMMISSION SPOTLIGHT

Protecting Our Rare Mountain Flier

Threatened by loss of habitat due to the impacts of exotic insects, air pollution and development, the endangered Carolina northern flying squirrel (*Glaucomys sabrinus coloratus*) is the subject of intense study in the western North Carolina mountains. Biologists with the N.C. Wildlife Resources Commission are teaming with other agencies and many private individuals to study the distribution and ecology of this rare inhabitant of North Carolina's highest elevations.

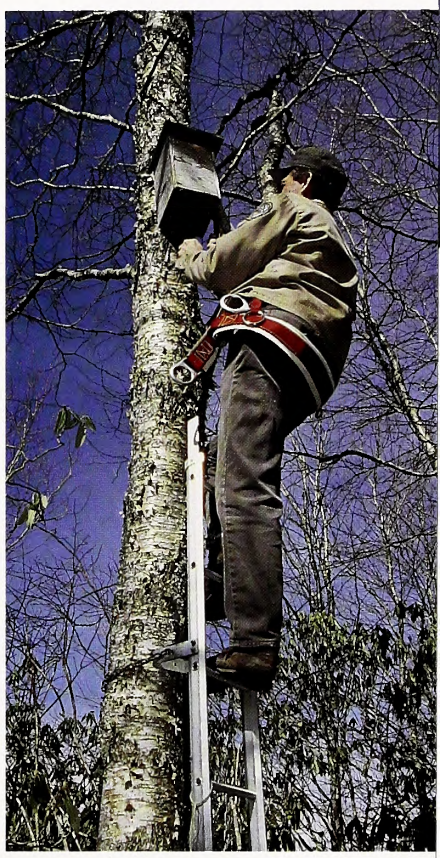
Rare Animals: There are just eight areas in western North Carolina with enough elevation (greater than 4,500 feet) and the right forest conditions to support northern flying squirrel populations. The squirrels are very secretive, nocturnal mammals. They spend their days sleeping in nests—constructed of birch bark shavings—within tree cavities during the winter and sometimes built within the foliage of trees (called a drey) during the warmer months. They are larger and darker than southern flying squirrels. Unlike their southern cousins, which are common throughout North Carolina, northern flying squirrels don't depend upon acorns as their primary food source. They primarily eat fungi, including truffles and lichens.

Habitat Modeling: Two studies are currently underway to determine if our understanding of the habitat needs of northern flying squirrels can be predicted through computer habitat modeling. Nearly 1,000 nest boxes have been erected in high-elevation areas from the Great Smoky Mountains to Grandfather Mountain to determine if habitat models can accurately predict the distribution of the species. The use of nest boxes is a relatively easy way to tell if northern flying squirrels are present in a given area.

Making a Difference: You can do your part to support flying squirrel research and management activities by making a tax-deductible donation to the Nongame and Endangered Wildlife Fund. Make your contribution through the check-off on your state income tax form, or give directly to: Nongame and Endangered Wildlife Fund, N.C. Wildlife Resources Commission, 1724 Mail Service Center, Raleigh, N.C. 27699-1724.

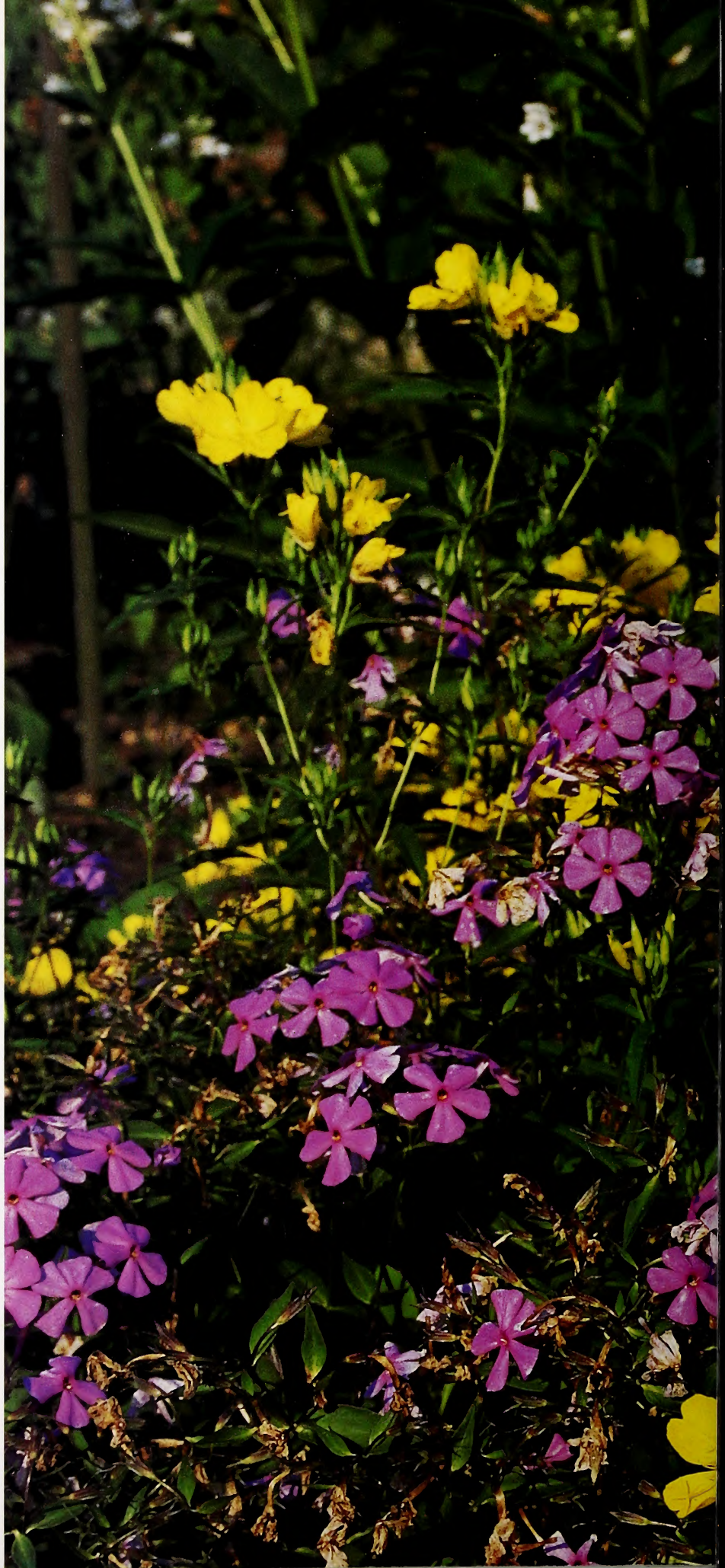
***The secretive Carolina** northern flying squirrel inhabits high-elevation forests in the western North Carolina mountains. This rare animal uses skin folds on each side of its body to glide gracefully from one tree to another.*

Photographs by Ken Taylor



***Biologists working** for the Wildlife Commission's Nongame Program check nest boxes to determine if flying squirrels have taken up residence.*

NORTH CAROLINA NONGAME & ENDANGERED WILDLIFE FUND



Sun Lovers

Southern sundrops and woodland phlox, two of North Carolina native wildflowers, make colorful partners in the sunny section of your garden. For other native plants that grow well in shade and sun, see page 17.

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WILDLIFE IN NORTH CAROLINA

MAY 2000 $1.50

Romancing the Redear

by Jim Dean ©2000

JIM DEAN

"What mere panfish could cause so much excitement? More to the point, what fish could eclipse the much beloved bluegill, every Southern angler's sentimental favorite?"

There was something different about this fish. Like the bluegills already in our cooler, it fought hard in tight circles. But it also made some longer runs, and its determined struggles transferred down the rod in a distinctive pulse. It was also decidedly bigger than anything we'd caught.

"Not a bluegill?" I ventured.

"No sir," said Cliff Edwards confidently. "I know what this is."

The slab of rambunctious energy Cliff finally landed weighed 20 ounces. More followed, fat and feisty. Most ran about a pound, some a good bit larger. They dwarfed the fish we'd caught even though a few of those bluegills were sizeable. It was no surprise to us that spring a dozen years ago. We'd long since learned to anticipate that these fish would run larger than the bluegills and fight harder. Some we'd caught on earlier trips had exceeded 30 ounces.

What mere panfish could cause so much excitement? More to the point, what fish could eclipse the much beloved bluegill, every Southern angler's sentimental favorite? Is it not sacrilege to suggest that another panfish—a foreigner, no less—might in fact be superior? After all, a bluegill is most likely the first fish any of us ever caught. Even serious anglers happily abandon their obsessive quest for more glamorous trout, bass and saltwater species during the peak of the bluegill spawning season each spring, knowing that bluegills will gather in the shallows to scoop out their beds, lay eggs and defend their handiwork against any small popping bug or intrusive cricket on a hook. Surely there must be something special about any fish that can challenge that heritage.

Meet the contender—the redear sunfish (*Lepomis microlophus*), more popularly called a shellcracker. Shellcrackers are native to waters in the Mississippi drainage and Deep South, but over the past 30 years or so, they have been widely stocked far beyond their original range. Shellcrackers now join the largemouth and bluegill as the most desirable gamefish species to stock in many warm-water ponds and lakes.

What makes this especially curious is the fact that shellcrackers look so much like bluegills that many fairly knowledgeable fishermen can't distinguish between them. There are, however, some significant differences. Shellcrackers most closely resemble our native pumpkinseed, but they lack the bright bluish bands on the side of the head. Like pumpkinseeds, however, the shellcracker's operculum (ear flap) has an outer border that is white or pale yellow with a red spot at the tip, and although these colors (especially the red tip) are not always very bright, the pale border is a fairly reliable identifying feature at a glance. By contrast, the ear flaps on bluegills are a solid color, often nearly black in mature fish. The redear's flanks often have a yellowish color relieved by spots—though these features are not always very noticeable—while bluegills have no spots, but may have vertical bars.

A redear also has rough patches of molars at the base of its throat that help it crush the aquatic insects, crustaceans and snails it prefers to eat, thus the nickname shellcracker. Shellcrackers and bluegills share some foods, but 'crackers are less apt to feed on the surface. The fact that shellcrackers are less prolific (thus less apt to overpopulate their habitat) and also harder to catch than bluegills may explain their tendency to reach larger average size.

Live crickets and red worms work well for both species, but shellcrackers often seem to prefer worms, especially fished on or near the bottom. Contrary to what many fishermen believe, shellcrackers will take artificials, and they'll even strike topwater poppers on occasion. They're suckers for 1/16th-ounce jigs—those with curly tails and a lead head covered by a soft-plastic body (chartreuse is my favorite color). I also catch lots of shellcrackers on simple, dark-colored sinking flies such as hard-bodied black ants. My favorite fly is tied on a No. 8 sproat hook, wrapped with black chenille and finished off with white rubber legs.

A word of warning. If you decide to stock shellcrackers in a favorite pond, be sure to get the pure strain. The shellcracker-green sunfish hybrid celebrated by some commercial fish suppliers is a truly miserable crossbreed you will come to detest for its eagerness to strike anything, then give up without a fight.

Go forth on a balmy day this May and make your own comparisons of bluegills and shellcrackers, and if you still can't tell them apart, be aware that exact identification is neither vital, nor possible, when the catch is dredged in cornmeal.

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Wildlife in North Carolina

Wildlife in North Carolina is the official educational publication of the North Carolina Wildlife Resources Commission. It is dedicated to the sound conservation of North Carolina's wildlife and other interrelated natural resources and also to the environment we share with them.

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written by Karen Kemp ©2000
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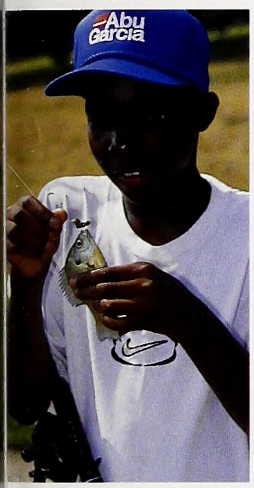

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illustrated by Chris Armstrong ©2000
Shortly after the Revolutionary War, state surveyors made their way up rocky trails and across steep gorges, from present day Ashe County to Cherokee Indian territory. The line they traced today separates North Carolina and Tennessee.

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Cover *A white ibis incubates its brown-splotched eggs at Battery Island, on the Cape Fear River. Photograph by Walker Golder.* ©2000

Wildlife in North Carolina (ISSN 0043-549X) is published monthly by the North Carolina Wildlife Resources Commission, 512 N. Salisbury St., Raleigh, N.C. 27604-1188. Periodicals postage paid at Raleigh, N.C. and additional mailing offices. Subscription rates: one year $7.50, three years $20, lifetime $100. All foreign subscriptions are $23.50 per year. For subscriptions from foreign countries, payment **only** by U S Postal Service money order or cashier's check drawn on a U.S. bank. All orders must be prepaid. Please allow 6 to 8 weeks delivery on new subscriptions and address changes. **POSTMASTER:** Send address changes to Circulation Manager, 1711 Mail Service Center, Raleigh, N.C. 27699-1711. Address all correspondence regarding subscriptions to Circulation Manager. If you have a problem with your subscription, dial (919) 662-4377. Articles in *Wildlife in North Carolina* may represent the personal views of authors, and do not imply endorsement by the North Carolina Wildlife Resources Commission. *Wildlife in North Carolina* is available on audio cassette as a courtesy of volunteer services of the Department of Cultural Resources, Library for the Blind and Physically Handicapped, Raleigh, N.C., (919) 733-4376. **The N.C. Wildlife Resources Commission is an equal opportunity agency.**

River Pancakes

written by Jeff Beane ©2000
illustrated by David Williams

Most folks know a turtle when they see one, but anyone laying eyes on his very first softshell turtle is likely to do a double take. Indeed, softshells, with their flattened, leathery shells, long necks and pointed, tubular snouts, are among the world's oddest-looking turtles.

Softshells belong to the family Trionychidae, which ranges widely across North America, Africa and Asia and contains 14 genera and 23 species, all fairly large and highly aquatic. Three species occur in North America, but North Carolina has just one—the spiny softshell (*Apalone spinifera*), so named for the scattering of small tubercles on the front edge of its upper shell, or carapace. Two races, or subspecies, occur in the state. The Gulf Coast spiny softshell (*Apalone spinifera aspera*) is the more common and widespread and occurs primarily in the Pee Dee and Santee river systems. The other subspecies—the Eastern spiny softshell (*A. s. spinifera*)—is poorly known, apparently rare and state-listed as a special concern species. Only a few definitive records are known, all from the French Broad drainage. The two subspecies may be distinguished by the two stripes on the side of the head and neck—the stripes are separate and parallel in the Eastern spiny softshell and joined in a "Y" in the Gulf Coast subspecies. The Gulf Coast spiny softshell also usually has two or more dark lines, or traces of lines, bordering the rear edge of its carapace, while the Eastern spiny softshell has only one.

Other than the huge leatherback sea turtle, softshells are our only turtles lacking scutes. Their round, flexible shells are instead covered by leathery skin. Both our subspecies are yellowish brown to olive-gray in color, with dark spots and smudges, giving them the appearance of large, flat cookies or pancakes. Their bottom shell, or plastron, is usually plain white or yellowish.

Softshells have heavily webbed feet and are strong swimmers. They can also move rapidly (for a turtle) on land. Handling a large adult requires caution—some individuals will bite and scratch vigorously if restrained, and their powerful jaws and flailing limbs with strong claws can be a rude awakening for anyone handling one carelessly. Their long necks also give them a greater bite radius than other turtles.

Female softshells grow larger than males, reaching a maximum straight-line carapace length of about 18 inches (washtub-sized). Males seldom reach half that size.

Softshells are among the most carnivorous of our freshwater turtles, feeding mostly on aquatic insects, crustaceans and worms, and occasionally on small fishes or carrion. They may forage actively or lie buried, waiting to ambush prey. Probably our most aquatic turtles, they occasionally bask but otherwise rarely leave the water except to lay their eggs. Softshell eggs are spherical like those of sea turtles and snapping turtles (unlike the more oval-shaped eggs of most aquatic turtles).

Softshells live primarily in rivers and large streams with sandy or muddy bottoms, but they also occur in lakes or other quiet bodies of water with sand or mud bars. They can quickly bury themselves in sand or mud when pursued. They blend in well with sandy bottoms, and sometimes lie in shallow water, using their long necks and snorkel-like noses, with the nostrils situated at the very tip, to reach the surface and breathe without leaving the safety of the sand or mud.

Since softshells are infrequently encountered in North Carolina, they are often regarded as curiosities when accidentally caught by bait fishermen, and are sometimes transported to areas where they do not occur naturally. This explains a large softshell found several years ago, wandering in a Raleigh subdivision with a fishhook in its mouth. It may also explain a questionable Gulf Coast spiny softshell record from Columbus County and another from Harnett County, a huge male Eastern spiny softshell recently found in Rockingham County, and occasional reports of softshells from the northeastern Coastal Plain.

Much remains to be learned about the natural history, distribution and status of softshells in North Carolina. You can help by reporting sightings to the North Carolina State Museum of Natural Sciences. These interesting turtles aren't really so odd after all—they're just well adapted to their way of life.

Jeff Beane is a curator of reptiles and amphibians at the N.C. State Museum of Natural Sciences in Raleigh.

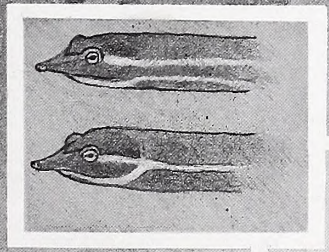
Other Reading:

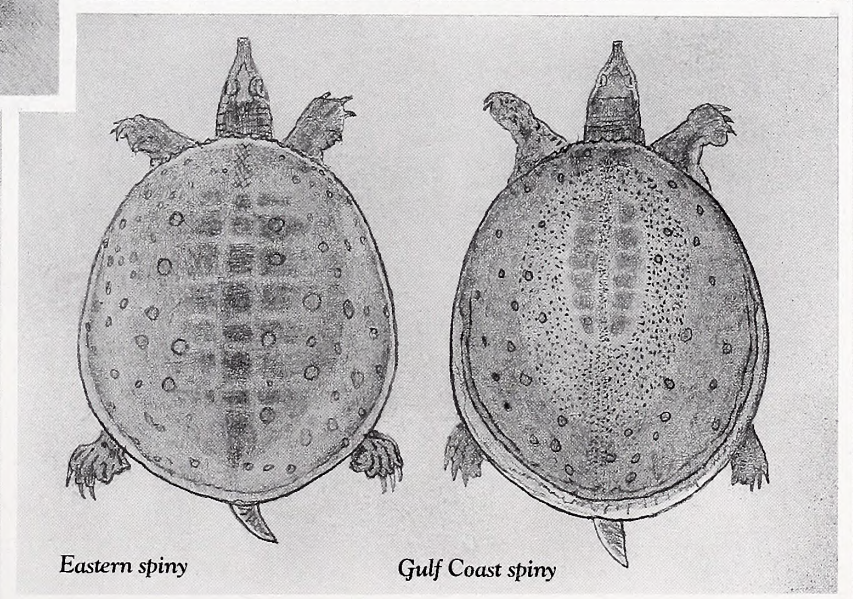
- Carl H. Ernst and Roger W. Barbour, *Turtles of the World* (Smithsonian Institution Press, 1989).
- Carl H. Ernst, Jeffrey E. Lovich, and Roger W. Barbour, *Turtles of the United States and Canada* (Smithsonian Institution Press, 1994).
- Bernard S. Martof, William M. Palmer, Joseph R. Bailey, Julian R. Harrison III, and Jack Dermid, *Amphibians and Reptiles of the Carolinas and Virginia* (University of North Carolina Press, 1980).
- Joseph C. Mitchell, *The Reptiles of Virginia* (Smithsonian Institution Press, 1994).
- William M. Palmer and Alvin L. Braswell, *Reptiles of North Carolina* (University of North Carolina Press, Chapel Hill, 1995).

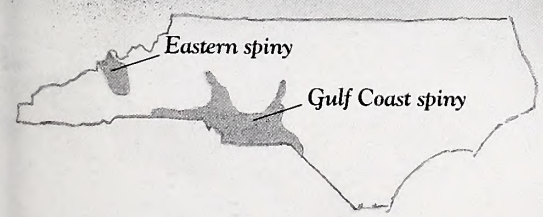
Surfing the Web

- This web site contains general information on North American softshell turtles.
  *Address:*http://www.tortoise.org/archives/apalone.html
- To see photographs of spiny softshells, see these web sites.
  Addresses: http://www.bio.davidson.edu/Biology/herpcons/Herps_of_NC/turtles/apaspi.html; http://www.inhs.uiuc.edu/cbd/herpdist/species/ap_spinife.html; http://www.chicagoherp.org/herps/turtle/Aspinif.htm

A spiny softshell's snorkel-nose *enables it to breathe while lying concealed on the sandy bottom of a river or stream. Softshells are not only odd-looking, but also rank among our most poorly known turtles. The two subspecies found in North Carolina can be distinguished by their neck stripes (left). On the Gulf Coast subspecies, the two stripes join in a "Y." On the Eastern subspecies, the stripes are separate and parallel.*







Only a few records *of the Eastern subspecies have been found, all from the French Broad river basin. The more common Gulf Coast subspecies occurs primarily in the PeeDee and Santee river basin.*

The leathery carapace *of the Eastern spiny softshell has only one faint, broken line bordering its rear edge. On the Gulf Coast spiny softshell, there are two or three lines.*

New Museum

SPREADS ITS WINGS

N.C. MUSEUM OF NATURAL SCIENCES

After decades of cramped quarters, the venerable State Museum of Natural Sciences has unveiled its new building in Raleigh. It's already being hailed as the Southeast's premier natural history showroom.

written by Karen Kemp ©2000

If you haven't visited the North Carolina Museum of Natural Sciences in downtown Raleigh lately, you're in for a surprise. The new museum opened on April 7 with four floors of completely new exhibits, expanded daily programs and renewed vitality. Director of Exhibits Roy Campbell declares that when visitors walk in, "they're blown away."

Perhaps we can excuse Campbell's crowing. At 200,000 square feet, the $71 million museum is the Southeast's largest natural history museum. Its exhibits immerse visitors in dynamic environments, from the eerie luminescent world of the deep ocean to a spruce-fir forest atop an Appalachian mountain. Significant new specimens are displayed, including a rare skeleton of Earth's largest creature, the blue whale; and a unique *Acrocanthosaurus* dinosaur (See "Dinosaur Mysteries," page 9). Educational programs are blossoming in this fertile soil.

To museum director Betsy Bennett, it's as if a breathtakingly beautiful butterfly has emerged from a humble brown cocoon. For decades, the museum's reputation for top-notch environmental education has grown, even as the institution struggled to meet visitor demands in a cramped, outmoded building. Established in 1879 and the first of North Carolina's state capitol museums, the Museum of Natural Sciences was the last to get a makeover.

"There is grandeur in the new museum," Bennett says. "Now our building finally matches the quality of our programs." With triple the

***Beneath the skylit** dome of the new museum, the age of dinosaurs lives on. As winged pterosaurs float overhead, a carnivorous* Acrocanthosaurus *attacks a 50-foot sauropod in a scene from 125 million years ago.*

Darner Dragonfly

classroom space, distance learning connections, a 260-seat auditorium, a café—the new museum is infinitely more functional than before. Open two- and three-story, cathedral-like spaces and large-scale exhibits help convey a sense of awe and reverence for nature. A dramatic three-story dome anchors the building's northeast front corner, mirroring the dome on the nearby State Capitol.

"The new museum is expansive and captures the breadth of North Carolina's natural world," Campbell says. "Visitors walk through 20 life-size dioramas and discover surprises in every nook and cranny."

The museum developed new exhibits replete with entertaining, hands-on activities. Visitors can flip question-and-answer panels, cook up a hurricane on the Weather Kitchen computer, match animal calls with their makers, or play video clips. More than 260 small animal species live in realistic exhibits known as bioramas. In museum parlance, the exhibits are "interactive."

But behind the fun lies an urgent mission. "North Carolina and the world are increasingly urban," Bennett says. "Fewer and fewer people hike in the woods, canoe down a river or observe life outdoors. I'm concerned about that. It means people are less connected to the life of the planet. We want to show people how complex and fascinating that life is. We hope they'll turn that knowledge into better stewardship."

Bill Holman, secretary of the N.C. Department of Environment and Natural Resources, of which the museum is a part, shares that vision. "The state's ozone pollution, water quality and land-use problems make it clear that we need better informed leaders and citizens. Regulations can't do it all. We need effective environmental education as well."

Museum exhibits branch out beyond North Carolina in *Tropical Connections* and the *Living Conservatory* on the third and fourth floors. "These exhibits encourage people to look beyond the state's borders and see that North Carolina is connected to the rest of the world," says Mary Ann Brittain, director of school programs and chair of the tropical exhibits committee.

In *Tropical Connections*, you can walk around a large globe and see that the tropics contain grasslands and mountainous regions as well as high-profile rain forests. Nearby, you can eavesdrop as lifelike models carry on "conversations" about overfishing or ecologically sound agricultural practices. "You find out that folks in other parts of the world have the same environmental concerns you do," Brittain says.

The tropical theme continues in the fourth-floor *Living Conservatory*. Walk through a dry tropical forest and see live ruby-throated hummingbirds, butterflies and a two-toed sloth. Live ferns, wild yams, milkweed and vanilla orchids grow in the sunlight streaming through the conservatory's glass ceiling.

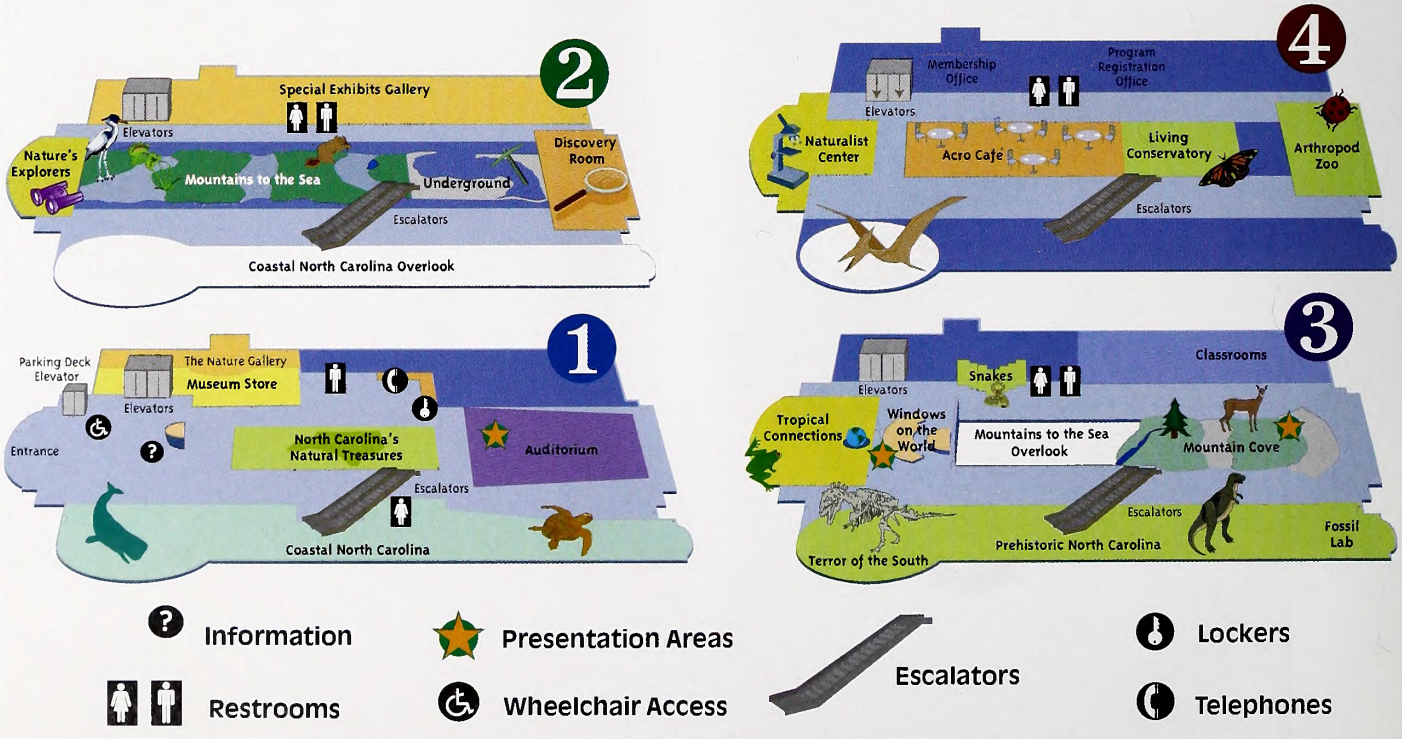
Yet the focus of the museum is North Carolina and its connections to the rest of the world. "It was a natural course to take," Bennett recalls. "North Carolina's latitude puts the state at the northern limit of many southern species' range and the southern limit of many northern species' range. We have nearly every habitat here, from subalpine forests to temperate grasslands and barrier islands. North Carolina has incredible natural diversity. We wanted to celebrate that. Biodiversity doesn't exist solely in the tropical rain forest. You've got it in your backyard."

Visitors explore the four floors of exhibits, filling the museum with new energy and excitement. They hear frog sounds and match them with videos of the calling amphibians. They dig in fossil dirt, look through binoculars and encounter colorful salamanders. Throughout the new museum, staff and trained guides stand by in exhibit halls, ready to answer questions and offer specimens to compare. "The museum looks completely new," Bennett says, "but at its heart, it's still about people sharing their passion for the natural world. I believe the best 'interactive' in an exhibit hall is two people talking."

Let's take a walk through several of the other galleries in the state's new museum. ⊠

N.C. MUSEUM OF NATURAL SCIENCES

Take a Museum Tour



MELISSA McGAW

Mountains to the Sea Exhibit. An escalator transports you to the second floor, where spring is arriving in the *Mountains to the Sea* exhibit. To prepare for the journey, pause at "Natural Communities." Reach into a dark cavity and guess what you feel—a turtle shell, a beaver pelt, the bark of a dogwood tree. Sniff. It's the fragrant scent of a sweet bay magnolia in bloom. A large map on the wall links the sensory experiences to places in the state where the plants and animals can be found.

"The idea is to encourage people to become better observers in their backyards and elsewhere, to help them approach nature with all their senses," says Mike Dunn, museum educator and *Mountains to the Sea* exhibit committee co-chairman.

Thirty-foot trees jut up through the open ceiling to the third floor. At one end, a mountain rises. A waterfall cascades into a chilly trout pool. The mountain, modeled on Linville Gorge, is an engineering marvel. Beneath the moss- and lichen-covered stone, unseen by visitors, a massive steel skeleton suspends the entire rock face a quarter inch off the floor.

The 7,000-square-foot exhibit recreates five habitat types. Water runs from the mountain waterfall and trout stream, trickles through a Piedmont beaver dam and re-emerges in a coastal cypress-tupelo swamp. A black bear and its cub forage among wiregrass beneath a canopy of longleaf pines. In this space filled with water, bird, frog and insect sounds, there is room for reflection.

"All your senses are engaged," says Campbell. "It's something like going to the theater, where you allow painted sets and actors to carry your imagination to another place. We wanted to offer people more than a knowledge of 'what it is.' We hope that each visitor, instead of leaving the museum with a head full of facts, senses that he or she is also a part of nature's web."

JIM PAGE, DENR OFFICE OF PUBLIC AFFAIRS

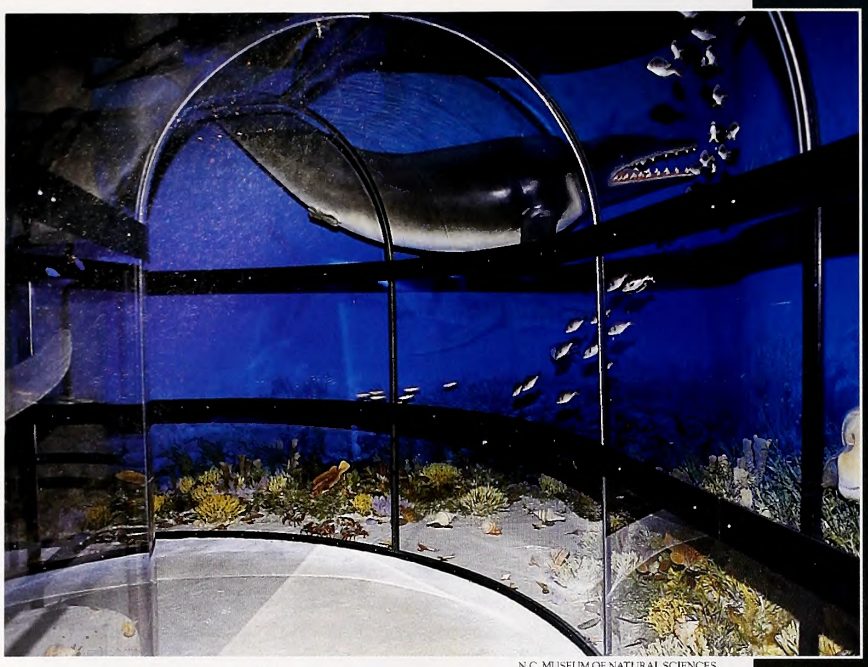
Venus's-flytrap

North Carolina's Natural Treasures. Here you can discover the state's stars: the Venus's-flytrap, native only to a 75-mile radius of Wilmington; spotted and marbled salamanders, two of the 58 species that make North Carolina's salamander diversity the continent's richest; the iridescent ruby-throated hummingbird. As you weave among the jewel cases, you hear the voices of native writers, musicians and artists influenced by these riches. Along one wall, you can enter your county's name into a computer kiosk to discover signature species and wild places near you. Overhead, tundra swans honk loudly as they wing toward *Coastal Carolina*.

"North Carolina has incredible natural diversity. We wanted to celebrate that."

—Betsy Bennett
Museum Director

MELISSA McGAW



N.C. MUSEUM OF NATURAL SCIENCES

MELISSA McGAW

COASTAL CAROLINA. The gallery extends the length of the first floor, a block long. The ceiling floats two stories above, and natural light floods in through 20-foot-tall windows. As you gaze up from the first floor or out from the second-floor balcony, you see four massive whale skeletons swimming through the air.

Your journey through *Coastal Carolina* begins in the salt marsh with "Masses of Grasses." Lugworms, burrowing shrimp, oysters and fiddler crabs thrive here in the "squishy soup that's the basis of life," says research curator of fishes Wayne Starnes. Legions of aquatic creatures get their start in the marshes and sounds, and these young are the vital first course for the entire coastal food web.

In the sound diorama, see something that amazes every shore-based snorkeler: a complex encrusting community thriving on a pier piling. In the ocean, any hard surface quickly becomes an anchor for all kinds of life, from barnacles, oysters, sea lettuce and sea squirts to the red drum and sheepshead that hide and feed among them.

As you continue eastward, look for birds and mammals sheltered in a maritime forest. Pass the shifting dunes of a barrier island and a tidal zone, whose opportunistic inhabitants catch meals quickly. In the 18-foot-wide continental shelf diorama, models depict more than 100 different species including corals, lobsters, brilliant damselfish and blue tangs. The species richness is mind-boggling, but true to life, Starnes says. "People don't know it because they don't see it, but there are 760 species of fish alone off the coast of North Carolina."

Some of nature's weirdest forms of life are found on the continental slope. In this pitch-black world, lighted creatures often use bioluminescence defensively. The "barfing shrimp" actually spits up a glowing cloud to confuse predators.

Throughout *Coastal Carolina*, you will see animals such as the loggerhead turtle and American eel that occur in nearly every coastal zone. "They use different habitats during different stages of their lives," Starnes says. "By telling their stories, we can easily show how the habitats are interconnected and how all are important."

MELISSA McGAW

ARTHROPOD ZOO. Jesse Perry, public programs director, predicts lots of folk will make a beeline here. Nearly every kid has captured a bug and put it in a glass jar to watch, he says. "We want to keep that childlike sense of wonder about insects alive in this place," Perry says.

Arthropod Zoo inhabitants change seasonally, ensuring a different experience each time you visit. Curator Bill Reynolds is passionate about his charges, from the native Hercules beetle to the exotic walkingstick. "When people find out that I work with arthropods, they always ask me, 'What good are they?'" Reynolds says. "I tell them they are the gas and oil of the car that's Earth."

Karen Kemp is the director of public relations at the Museum of Natural Sciences.

Dinosaur Mysteries

Dinosaurs—those perennial natural history museum favorites—are plentiful in the new North Carolina Museum of Natural Sciences. The signature *Terror of the South* exhibit features the only *Acrocanthosaurus* exhibited anywhere in the world. The 112-million-year-old "Acro" pursues a lumbering 50-foot-long sauropod across the Coastal Plain. Winged pterosaurs fly overhead as thunder rumbles and lightning flashes in the humid Cretaceous environment. The exhibit sits inside a dramatic three-story tall dome, visible to passersby outside.

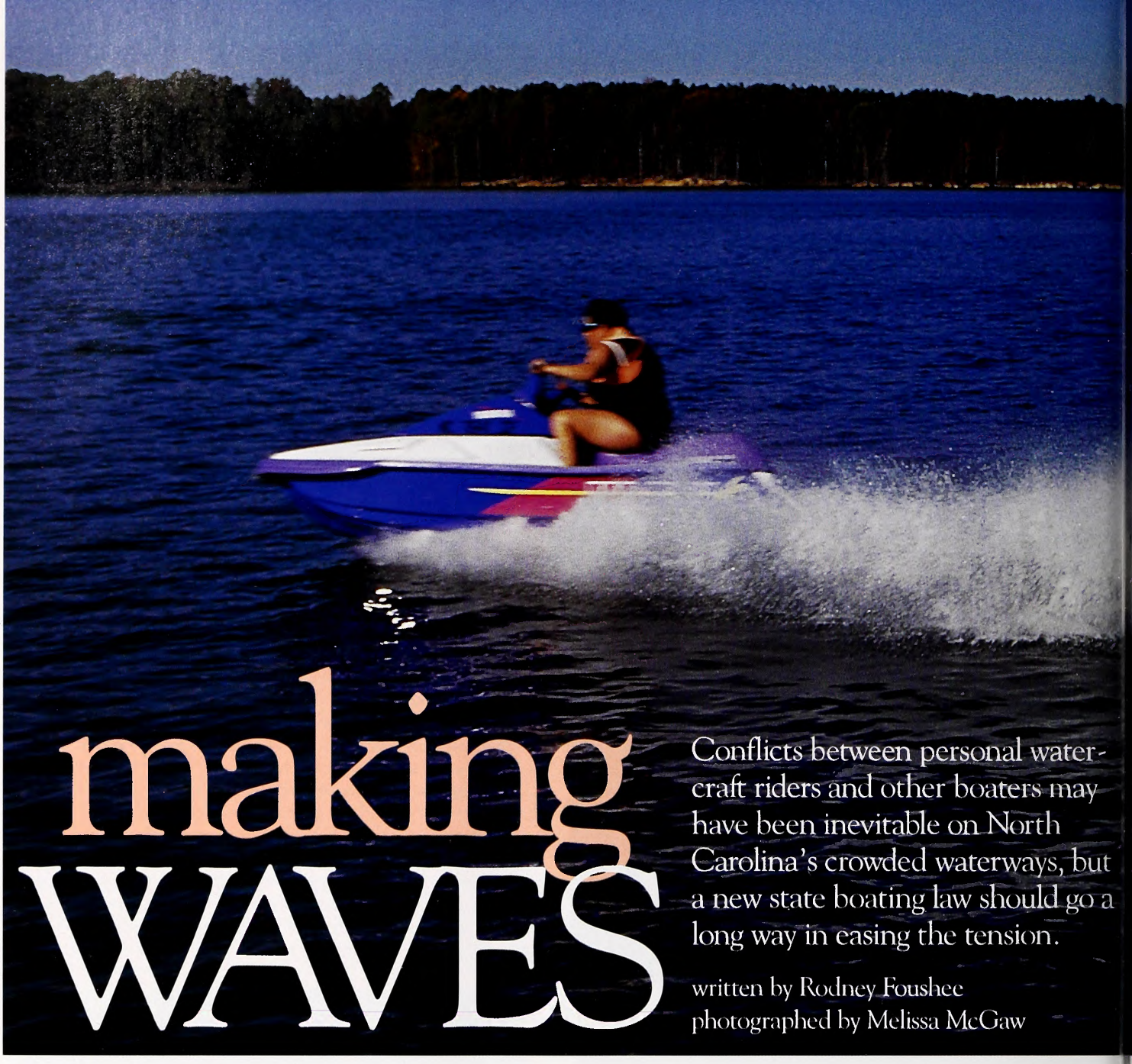
"This is a real specimen of a rare dinosaur that lived in the South," says Dale Russell, the museum's senior curator of paleontology. "We made some fascinating discoveries while the bones were being prepared for exhibit. We found evidence of scarring from bone-deep wounds, and the tooth of a pre crocodilian beast imbedded in Acro's jaw."

Russell, who is also a professor at N.C. State University, will work with other paleontologists to continue studying the fossil. Anonymous private donors purchased Acro for $3 million and donated it to the museum. They contributed another $1 million for the exhibit.

"There's nothing like this anywhere," according to director of exhibits Roy Campbell. "The exhibit is based on fossilized footprints of these beasts that were found side by side, so it's like a snapshot of an ancient event."

Acrocanthosaurus is one of several significant new dinosaur specimens. In *Prehistoric North Carolina*, visitors can see an *Edmontosaurus* frantically trying to protect her eggs and hatchlings against attack from a hungry *Albertosaurus*. In a scene from the Triassic era, 225 million years ago, a Rauisuchid—a distant relative of today's crocodile—hunts for its next meal among ferns, conifers and cycads. *Prehistoric North Carolina* takes visitors through 4.6 billion years of geologic history, from the beginning of the universe through the early 1700s.

MELISSA McCAW



making WAVES

Conflicts between personal watercraft riders and other boaters may have been inevitable on North Carolina's crowded waterways, but a new state boating law should go a long way in easing the tension.

written by Rodney Foushee
photographed by Melissa McGaw

With the summer sun at his back, Allen Watkins idles away from the busy boat ramp, pointing the bow of his brightly colored vessel toward the open water of Kerr Lake. With a twist of the throttle, the tiny watercraft erupts from the placid water, propelled by an 85-hp jet engine. Seconds later, the craft has reached the limit of its digital speedometer—50 mph—and it can go a little faster still. Speed is seductive as the fiberglass hull skims across the smooth lake. A 90-degree turn is but a thought as the nimble craft shifts directions, now racing toward the shoreline.

Chances are good that on any given summer weekend you'll find Watkins—along with his wife and friends—enjoying the waters of Kerr Lake from the padded seat of the 11-foot long craft. Or being towed behind the speedy vessel on skis or on an inner tube.

"With a jet ski, you actually enjoy the ride," explains Watkins, 30, who grew up around Kerr Lake using traditional boats. "I like jet skis better than regular boats because you get wetter and you get to be more active in the water. There is also a lot more interaction with the skier and other riders."

Personal watercraft—or PWCs as these water jet-powered boats are collectively called—have advantages over standard recreational boats. Their jet motors allow personal watercraft to skim over extremely shallow waters that would ground traditional propeller-driven boats. The same jet propulsion gives personal watercraft maneuverability not possible with prop-driven boats.

"I can do everything with my jet ski that I can do with a boat plus I can reach places regular boats can't," Watkins says. "I can pull skiers and tubes. I can carry extra riders—up to three people on my jet ski (some PWCs can carry up to four people)."

And the price tag on a PWC reflects another important advantage. The average new personal watercraft sells for $7,000—about half the price of a comparable power boat; a used model like Watkins owns can be had for a few thousand dollars.

"It is easier to get in and out of the water," Watkins says. "There is a lot less maintenance with a jet ski, less cost to driving one and less cost to owning one. Basically, you just put in gas and oil, keep it tuned up and you're ready to go!"

***Though personal** watercraft are popular, not everyone enjoys their presence. A new state law, in effect this year, should help reduce close calls like the one recreated above by requiring a no-wake speed for personal watercraft near docks, shorelines and anglers.*

Watkins is not alone in his enjoyment of these speedy craft. Considered a novelty when they were first introduced two decades ago, personal watercraft now represent the fastest growing sector of boating in America. Closer to home, PWCs account for nearly 10 percent of the 340,000 boats registered in North Carolina.

More significant, personal watercraft—because of their lower cost—have made boating accessible to people who haven't had access to the water.

But not everyone finds pleasure in this new-found recreation. Many traditional boaters consider personal watercraft nuisances—if not outright hazards—on the state's crowded lakes and waterways. A fisherman intent on enjoying a Saturday afternoon wetting a line in the seclusion of his favorite cove suddenly finds his solitude shattered by the buzz of a PWC engine. As the PWC rider makes a tight arc around the cove and then a quick exit, there is little left for the angler to do but brace himself for the ensuing wake and hope every bass in the cove hasn't scattered.

However, a new law enacted by the North Carolina General Assembly and aimed at personal watercraft (see "The New Law," page 12) may go a long way to ease tensions and make the waters safer.

SAFETY CONCERNS

Safety is one of the main reasons for the new law.

PWCs represent less than 10 percent of all recreational boats in use nationally, yet they account for a third of the country's boating accidents, according to the U.S. Coast Guard. In North Carolina, personal watercraft were involved in 102 of the 251 boating accidents reported in 1998, the last year complete statistics were available from the N.C. Wildlife Resources Commission. Five of those accidents were fatal.

the NEW LAW

The N.C. General Assembly enacted a new personal watercraft law that took effect Dec. 1, 1999. Below are highlights of the major provisions of the new law:

WHO CAN OPERATE A PWC?

- No one under 12 years old can operate a PWC in North Carolina waters.
- A person between 12 and 16 years old can operate a PWC if: they are riding with a person who is at least 18; or the youth has first successfully completed an approved boating safety education course (proof of age and safety course completion must be carried by the youth during operation of the PWC.)

PWC OPERATION

PWCs must be operated at all times in a reasonable and prudent manner. Maneuvers that endanger people or property constitute reckless operation including:

- Unreasonable or unnecessary weaving through congested boat traffic.
- Jumping the wake of a vessel within 100 feet of the vessel or when visibility is obstructed.
- Intentionally approaching a vessel in order to swerve at the last moment.
- Operating at faster than no-wake speed within 100 feet of an anchored or moored vessel, the shoreline, a dock, pier, swim float, swimming area, swimmers, surfers, anglers or manually propelled boat.
- Following a vessel, including another PWC, too closely.
- No one can operate a PWC on state waters between sunset and sunrise.

SAFETY COURSES

For information on approved boating safety courses contact:

- N.C. Wildlife Resources Commission, (919) 733-7192
- U.S. Power Squadron, (888) 367-8777, www.usps.org
- U.S. Coast Guard Auxiliary, (800) 336-2628, www.uscgaux.org
- Boat/U.S. free online course, www.boatus.com

For a complete look at the new law, check out www.wildlife.state.nc.us/Boating/law/ or call (919) 733-7192.

"Unlike most vehicles or vessels, you can't steer a PWC when you're not giving it gas," explains Lt. Mike Bogdanowicz, the Wildlife Commission's boating safety coordinator. "With a PWC, when you let off the throttle, you lose all steering capability." This causes plenty of accidents, especially with inexperienced riders who instinctively let off the throttle when approaching a hazard only to helplessly slam into a dock or approaching boat.

Concerns for safety encouraged the General Assembly to pass the state's new personal watercraft law. Among the major provisions of the law, which took effect Dec. 1, 1999, are: a statewide minimum age for operating a PWC, a requirement for boating safety instruction for operators under 16 and a 100-foot buffer rule that makes it illegal for PWCs to speed by docks, shorelines, swimmers, anglers and anchored boats.

All of these provisions should help reduce accidents on the water, according to Lt. Bogdanowicz. "The new law will certainly help to educate the boating public as the young PWC operators who are required to take the education class grow older and become boat operators."

And the new 100-foot buffer rule should help keep a safer distance between vessels to avoid mishaps in the first place. "Most of the PWC accidents in the past were collisions, so this should lower that number," Lt. Bogdanowicz said.

Larry Lambrose, executive director of the Personal Watercraft Industry Association, supports mandatory boater education and buffer rules to keep boats at safe distances. However, he disputes the idea that PWCs are any more dangerous than traditional boats. "PWCs get a lot more usage than average boats," he said. "When you have more exposure, the significance of the accident percentages diminishes." For example, a traditional boat may spend the whole day on the lake, but only actually be run for an hour to get from one place to another. The typical PWC, on the other hand, could easily be operated for nearly the entire 8-hour period it's on the water.

USER CONFLICTS

"Live to ride, Ride to live." Harley-Davidson Motor Co.'s famous slogan may have been coined to represent the unique lifestyle of American motorcyclists, but the slogan captures the motivation of many personal watercraft riders as well. Just as with a rumbling Harley, it's not getting to the destination that's important—but simply riding. And that ride for some PWC operators includes jumping boat wakes, making abrupt turns and buzzing shorelines. That's where the rub lies with waterfront property owners and traditional boaters, especially anglers.

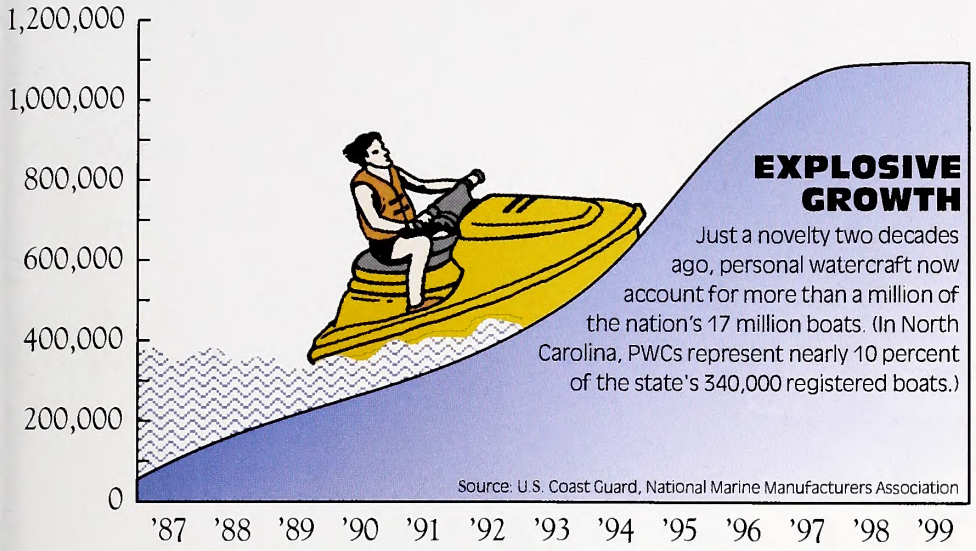
"Some people think PWCs are reckless just by the way they operate," explains Wayne Jones, a fisheries biologists with the N.C. Wildlife Resources Commission who has been studying user conflicts on North Carolina's lakes. "PWCs have definitely changed the traditional view of the use of the water, but many people have been turned off by their antics."

With a limited amount of water available, fishermen appear to be extremely sensitive to the rise in personal watercraft. "It looks to us that in North Carolina as the number of personal watercraft on a given lake increases, the number of anglers there decreases as the anglers go to alternate sources including smaller ponds and even night fishing," Jones says. "PWC riders, on the other hand, don't seem to be bothered by additional boats."

A recently completed survey of some of North Carolina's largest reservoirs reveals that crowded conditions are reaching the point where resource managers must soon make some hard choices to avoid escalating user conflicts. Among the top complaints at Jordan, Falls and Kerr lakes are boat congestion and personal watercraft, according to Carol Banaitis, an Army Corps of Engineers forester, who is coordinating the boater recreation study on the three man-made lakes. Several hundred boaters were interviewed about their experiences on one of the lakes. Mail surveys were also sent out to several hundred more people.

"Overall, we found that most people are having positive experiences on these lakes," Banaitis said. "But shallow water areas, PWCs and congested areas were often mentioned as reasons to avoid sections of a lake."

Asked for more details about PWCs, boat-



ers who were surveyed said that it was the behavior of the riders that caused the most concern. This included getting too close to other boats and causing wakes around ramps, according to Banaitis. Many boaters had also noticed a rapid increase in PWC numbers on the lakes in the past five years.

More telling, the survey revealed that during the summer boating season all three big lakes are at their social carrying capacities, based on national standards. "Research on other lakes across the country tells us that overcrowding is not a serious concern as long as no more than 30 percent of the boaters say they prefer to see fewer boats on the water," Banaitis said. "We have now reached that 30-percent threshold on Jordan, Falls and the North Carolina portion of Kerr Reservoir."

A committee of agency stakeholders including the Army Corps, the Wildlife Commission and the N.C. Division of Parks and Recreation will meet this spring to come up with draft recommendations for future management of the three lakes. Hearings will then be held this summer to get public input before final management plans are put into place.

"PWCs will be addressed in the process, whether it is through an education campaign or something more stringent," Banaitis said. Banning personal watercraft from portions of a lake or creating expansive no-wake areas are just two options. Such zoning already exists on Falls Lake where a portion is off limits to gasoline-powered motors. "PWCs represent a valid use of the lakes just like other boats," Banaitis said. "Our challenge is to figure out how we can mesh all these uses together."

The Corps lakes aren't the only ones dealing with personal watercraft issues. Nearly every large body of water in the state has experienced some user conflicts involving PWCs.

"PWCs are definitely an issue on Lake Norman," says Ron Smith, executive director of the Lake Norman Marine Commission. "The biggest complaint on Lake Norman is about PWCs and their reckless operation. The only solution is increased enforcement of the existing laws."

Smith applauds the new statewide personal watercraft law as a step in the right direction. Lake Norman already had a similar law in effect before the General Assembly acted last December.

Others reactions to personal watercraft in North Carolina have been more severe, including an outright ban of the craft along 160 miles of the Cape Hatteras National Seashore. In response to numerous complaints from fishermen and others, National Park Service officials last May made much of the shoreline from Nags Head to Ocracoke off limits to PWCs. And this spring, the Park Service extended the ban on personal watercraft to a dozen more national parks and seashores nationwide and announced plans to ban the craft at even more federal parks including the Cape Lookout National Seashore within two years. Several other North Carolina coastal communities have also set aside large no-wake areas to discourage personal watercraft from operating in sensitive nursery areas.

HERE TO STAY

Though the market for personal watercraft seems to be leveling off, there are still about 1 million PWCs in service across the nation. And more than 30,000 personal watercraft operators will join other boaters on North Carolina's lakes and waterways this summer.

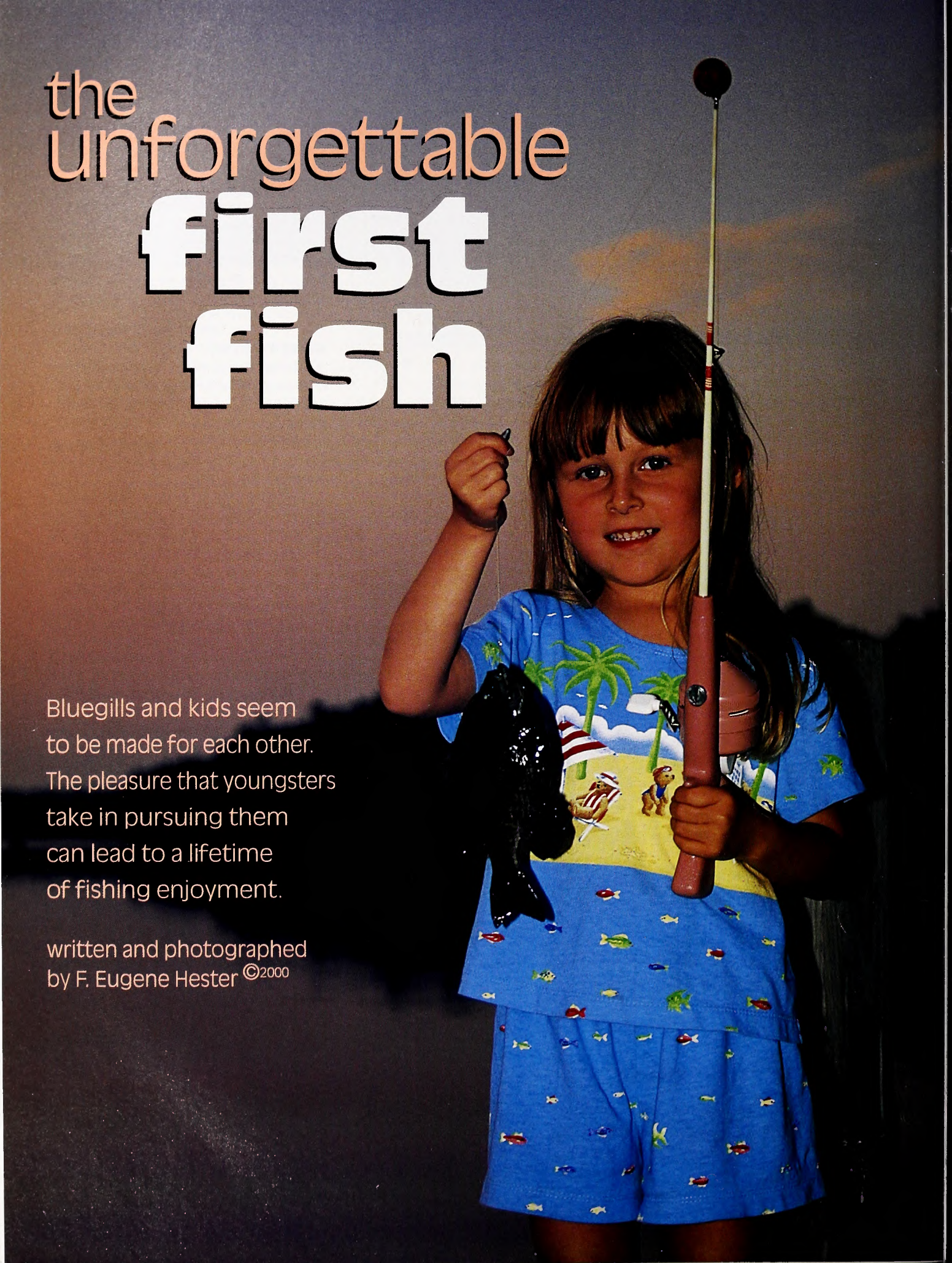
"Whether people like it or not, PWCs are here to stay," says Lt. Bogdanowicz. "The new law will go a long way to help reduce accidents and keep the peace. But if everybody makes an effort to respect the other users out there on the water—that is the best answer we can hope for."

That formula hasn't proven Allen Watkins wrong—he says he hasn't had any problems with other boaters since he purchased his personal watercraft three years ago.

"I stay out of the coves as much as possible," Watkins says. "I respect other boaters. If I see people fishing or skiing, I stay out of their way and try not to disturb them. If I was trying to fish and someone came flying by, it would make me mad too," Watkins says. "It's just about respect, it's that simple." ⊠

For most anglers, *the solitude of a cove or secluded bank adds to the fishing experience. With the state's lakes and waterways becoming more crowded, resource managers face the challenge of balancing the needs of anglers with those of other boaters including PWC riders.*

the unforgettable first fish



Bluegills and kids seem to be made for each other. The pleasure that youngsters take in pursuing them can lead to a lifetime of fishing enjoyment.

written and photographed by F. Eugene Hester ©2000

My granddaughter Heather and I sat on the boat dock watching her little red bobber floating on the pond. At first the bobber just sat there, moving only gently with the waves.

Then the bobber moved and stopped and then moved again. "Jerk it!" I said. Heather did jerk it, but there was nothing there. She looked at the bare hook and in disgust said, "He got my cricket again!"

Her comment expressed not only her disappointment but also her determination to get that fish.

"He is so sneaky," she said. "He keeps getting my crickets, but I will get him!"

After adding another cricket, she dropped the baited hook back in the same place. Soon the bobber moved again. This time when she jerked her little fishing rod, a fat bluegill tugged on the line. She cranked the handle on the reel and, after a good fight, the bluegill was reeled onto the dock. It flopped momentarily; then we unhooked it and dropped it into a bucket of water.

Since that day, Heather and her younger sister Alyssa have been two of my regular fishing companions. Their enthusiasm has been matched only by that of Will Edwards, a 5-year-old Wendell boy. Will's eagerness and his animated expressions liven any fishing trip. For Will a fish in a bucket is equally as exciting as one in a pond.

The way these youngsters have caught their first fish is similar to the way most kids do. Bluegills are abundant and cooperative at taking baits and lures, and because of this, they are usually the first fish young anglers encounter. No special equipment or technique is required, and the fish are available to anybody almost everywhere.

I remember, years ago, seeing kids catching bluegills using pieces of string with hooks made from bent safety pins baited with a small piece of earthworm. They were having a great time attempting to catch the little bait-stealing fish.

My own memory of early fishing trips is of times with my father and brother William. With my stubby little pole rigged with a short line and hook, I would dangle earthworms around submerged roots and logs to catch bluegills. Each trip was a great adventure filled with excitement, anticipation and the rewards of catching these sunfish.

Bluegills eat such a great variety of foods that finding bait for them is easy. A few earthworms dug from the garden are as good as anything. Crickets, grasshoppers and small crawfish also are easily caught and make great baits. In fact, for many youngsters, catching these little wild creatures for bait can be as challenging and rewarding as the fishing trip itself. But whether you catch your own or buy readily available worms or crickets, other baits, including doughballs, are also effective.

Bluegills can be caught in any month of the year, but they are most active in warm water, especially in springtime. And what could be better than taking a youngster fishing on a nice spring day?

Here are some suggestions to help make that all-important first experience a good one.

➽ Select a pleasant day—not too hot or cold or too windy. Most spring days are just right for this.

➽ Fish the pond or lake in advance to make sure it is a place with cooperative bluegills. Even a few minutes of waiting without action can become boring for a child. Be sure there will be a lot of activity at the selected site for this first fishing experience.

➽ Let the child catch the bait or go with you to buy it. Remember that the bait creatures may be almost as intriguing to the child as the fish will be. Let them see and handle the worms or crickets.

➽ Don't overlook safety. You and the child both need life vests, regardless of how shallow the water might be. Also, teach youngsters how to handle hooks safely.

➽ Make the trip a festive occasion by bringing some snacks. This becomes all the more important if the fishing action is slow.

➽ Have a bucket of water for holding the fish, even if for only a few minutes. A live fish is too exciting to simply unhook and throw back. Most children will want to watch the fish to see it swim and breathe, and they can do this by watching it in the bucket.

➽ Keep the trophy. Remember that for most kids their first fish, even a 5-inch bluegill, is a trophy. They will want to somehow keep it to show to others. One way is to carry it home in the bucket of water and later return it to the pond. This can be important in teaching the catch-and-release concept at an early age, too.

➽ A simple and effective way to honor the occasion is with a piece of cardboard (or a board) about 10 or 12 inches square. Lay the live fish on the cardboard and trace its outline with a pencil. Later sketch in the eye and the position of the gill cover and front fin. This can be labeled, for example: "HEATHER'S FIRST FISH—MAY 12, 1995, LAKE WENDELL" and kept as a memento.

➽ Use a camera to take photos of the adventure, especially of the child with the first fish. Even the inexpensive disposable cameras work well for this purpose.

➽ Rods and reels for children are readily available and inexpensive. Most are of the push-button spin-cast type. They serve the purpose well, and children as young as 3 or 4 years old can learn to use them quickly with supervision. But remember that many youngsters have caught their first fish with a simple stick, a piece of line and a hook.

I have heard it said that you can go fishing or you can take a child fishing, but you can't do both at the same time. Though that may not be entirely true, it does emphasize that a successful trip requires planning, encouragement and patience. And whether you're filling the limit or skipping rocks, what's important is that you and the young one are outdoors enjoying nature. That's a memory that will never be thrown back. ⊠

Few of life's pleasures *equal the thrilling tug of a fish on the other end of the line. For many children, like the girl on the facing page and the young man below, the initial contact with a wriggling sunfish is the beginning of a lifelong appreciation for aquatic species.*

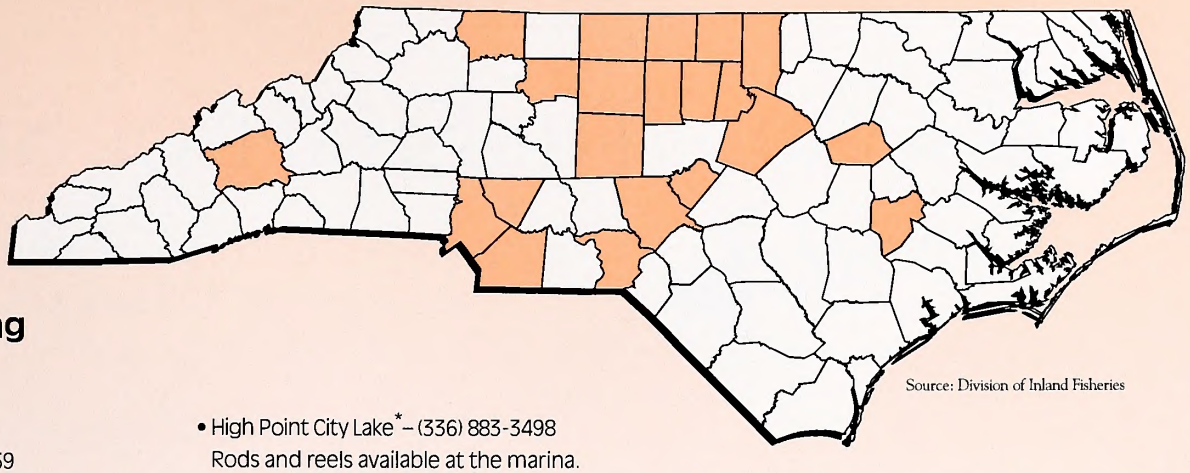
MAGIC LAKES...
where bobbers disappear

If you're an angler, chances are you can quickly name a half-dozen places to take a child for a fun-filled afternoon of bobbers and bream. But for other folks, especially urban residents, knowing where a youngster can catch a first fish isn't always that easy.

The Wildlife Commission's Division of Inland Fisheries has long recognized the importance of providing quality fishing experiences to those who live in the more densely populated areas of our state. Working with city governments, the Wildlife Commission has transformed a number of reservoirs and lakes into top-notch fishing holes. Fisheries biologists regularly stock these reservoirs, install fish attractors as well as perform population surveys, creel surveys and aquatic vegetation control. At some of the locations, the Wildlife Commission operates a Fishing Tackle Loaner program where children can borrow a rod and reel and tackle box, free of charge.

This program has resulted in a number of high-quality fishing spots anyone can enjoy. In addition, these sites have provided the backdrop for countless photos of delighted children, holding up their first fish. For a complete listing of all Community Fishing Program sites in North Carolina, call the Division of Inland Fisheries at (919) 733-3633. ⊠

The **N.C. Wildlife** *Resources Commission's Community Fishing Program stocks fish in urban lakes and reservoirs to favor young anglers like these. By providing high-quality fishing areas, the Wildlife Commission hopes to spark a lasting commitment to environmental responsibility.*



Source: Division of Inland Fisheries

Shaded counties contain Community Fishing Program Sites

Community Fishing Program Sites

ALAMANCE COUNTY
- Cedarock Park – (336) 570-6759 or (336) 570-6760
- Lake Cammack – Lake Cammack is open every day except Thursday. No phone.
- Graham/Mebane Lake – No phone.
- Lake Mackintosh – The lake is open year-round except on Tuesdays. No phone.

BUNCOMBE COUNTY
- Lake Tomahawk* – (828) 669-2052

CABARRUS COUNTY
- Frank Liske Park – (704) 782-0411

CASWELL COUNTY
- Lake Farmer – The lake is open Wednesday through Sunday, March 15 through Dec. 6 during daylight hours. No phone.

DURHAM COUNTY
- Lake Michie – The lake has a handicap-accessible fishing pier and offers excellent bank fishing. No phone.

FORSYTH COUNTY
- Kernersville Lake – (336) 727-2946
- C.G. Hill Memorial Park – (336) 727-2946
- Winston Pond – (336) 650-7677 or (336) 727-2063

GRANVILLE COUNTY
- Lake Rogers – No phone.

GUILFORD COUNTY
- Oka T. Hester Park* – (336) 373-2937
- Bur-Mil Park* – No phone.
- Lake Brandt* – (336) 545-5333
  Rod-and-reel combinations available at the marina office.
- Lake Higgins* – No phone.
- High Point City Lake* – (336) 883-3498
  Rods and reels available at the marina.
- Oak Hollow Lake – (336) 883-3494
- Lake Townsend* – (336) 375-2232
  Rod-and-reel combinations available at the marina office. The lake is open year-round except for Wednesdays, and night fishing is allowed on Thursdays during the summer fishing season.

LEE COUNTY
- San Lee Park – (919) 776-6221
  The ponds are located behind the Environmental Building/Office Complex.

LENOIR COUNTY
- Neuseway Nature Park* – (919) 939-3367
  Fishing equipment is available for loan at the park office.

MECKLENBURG COUNTY
- Freedom Park – (704) 875-1391
- Hornet's Nest Park – (704) 336-8096 or (704) 336-8798
- Reedy Creek Park – (704) 598-8857 or (704) 336-8798
- McAlpine Creek Park – (704) 568-4044 or (704) 336-8798

MOORE COUNTY
- Lake Luke Marion* – (910) 947-2504

ORANGE COUNTY
- Lake Michael* – (919) 563-4573

PERSON COUNTY
- Roxboro City Lake – No phone.

RANDOLPH COUNTY
- Lake Lucas – Open from March 16 through Nov. 14; the lake is closed only on Wednesdays. No phone.
- Lake Ramseur – The lake is open year-round except on Mondays. No phone.
- Lake Reese – Lake Reese is closed on Tuesdays during the fishing season, with lake hours from 6:30 a.m. to 30 minutes before sunset. No phone.

RICHMOND COUNTY
- Ellerbe Lions Community Park Lake – (910) 652-2791

ROCKINGHAM COUNTY
- Lake Reidsville – Lake Reidsville is closed to fishing November through January for duck-hunting season.

SURRY COUNTY
- Big Elkin Creek – (336) 835-9814
  Fishing equipment is available for loan at the park office.

UNION COUNTY
- Cane Creek Reservoir – (704) 843-3919

WAKE COUNTY
- Apex Community Park Lake – (919) 387-3065
  Fishing is by permit issued by the city only.
- Lake Crabtree County Park* – (919) 460-3390
  Boats can be rented.
- Shelley Lake* – (919) 831-6675
- Simpkins Pond – No phone.

WILSON COUNTY
- Lake Toisnot* – (252) 399-2265 or (252) 399-2266
  Fishing tackle is available for loan at the park office.

* *Designates the lake or pond as a Tackle Loaner program site*

THE SHAPE OF SPRING

Here's to the bird egg,

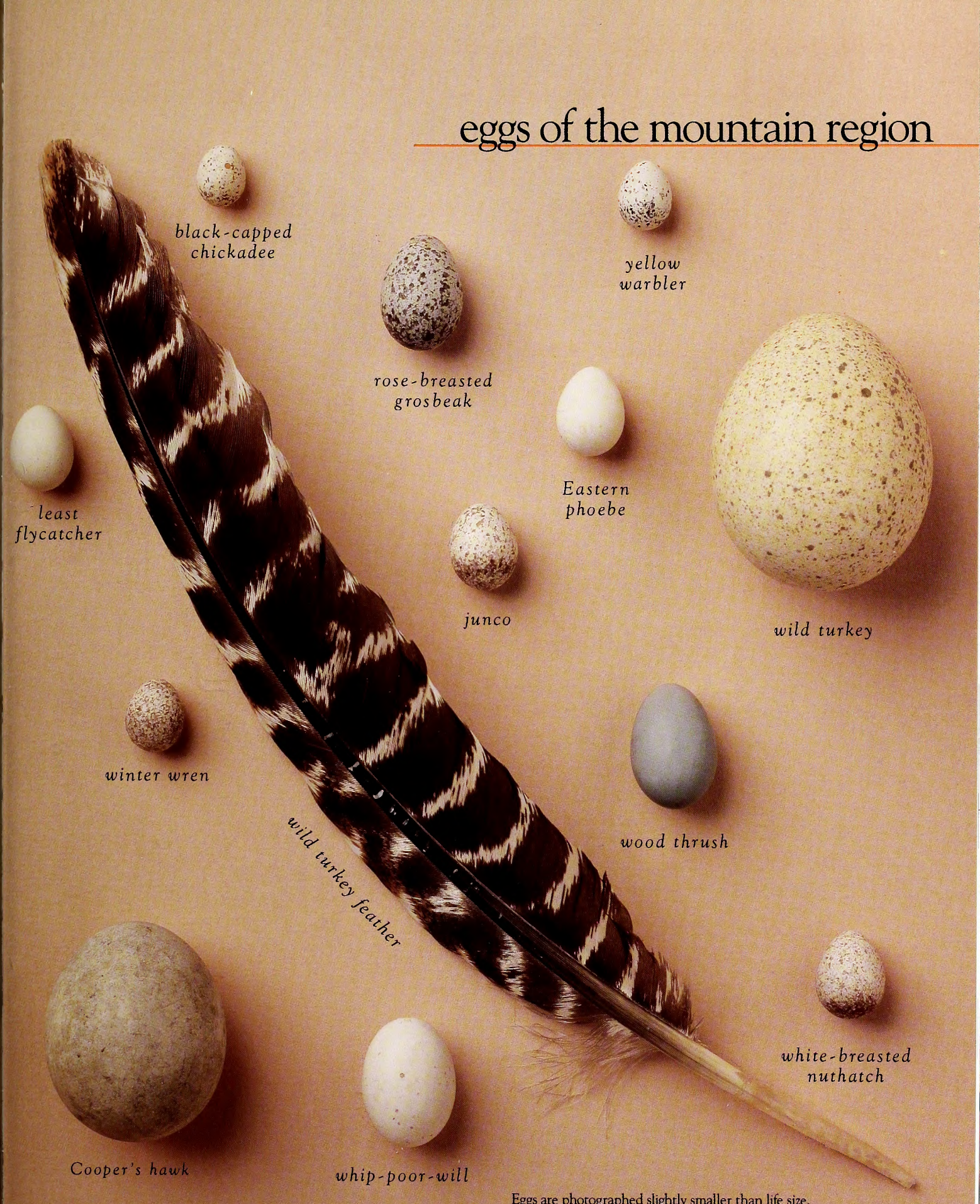
SPRING'S SIMPLE GIFT TO CHILDREN, COLLECTORS AND NATURALISTS OF ALL AGES. THE VARIABLE EGG IS A JOY TO THE EYES.

photographed by Melissa McGaw

A century ago, egg fanciers scoured the marshes and woodlands for bird eggs. Egg collecting—or oology, as it's called—was a popular hobby that taught generations of budding naturalists about the nesting habits and habitats of birds. It's easy to understand the lure of the egg—a vivid spectrum of colors, an inventive assortment of shapes, and a hopeful symbol of nature's rebirth.

below, hooded warbler nest and eggs

eggs of the mountain region



Eggs are photographed slightly smaller than life size.
Egg collection courtesy of N.C. Museum of Natural Sciences.

eggs of the piedmont region

hummingbird nest and eggs

catbird

blue jay

Eastern meadowlark

bobwhite quail

crow

nighthawk

great crested flycatcher

mallard

black vulture

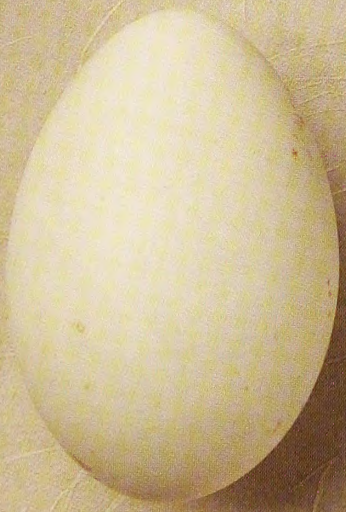
mourning dove

eggs of the coastal region

black skimmer

brown-headed nuthatch

great blue heron



ruddy duck

glossy ibis

least tern

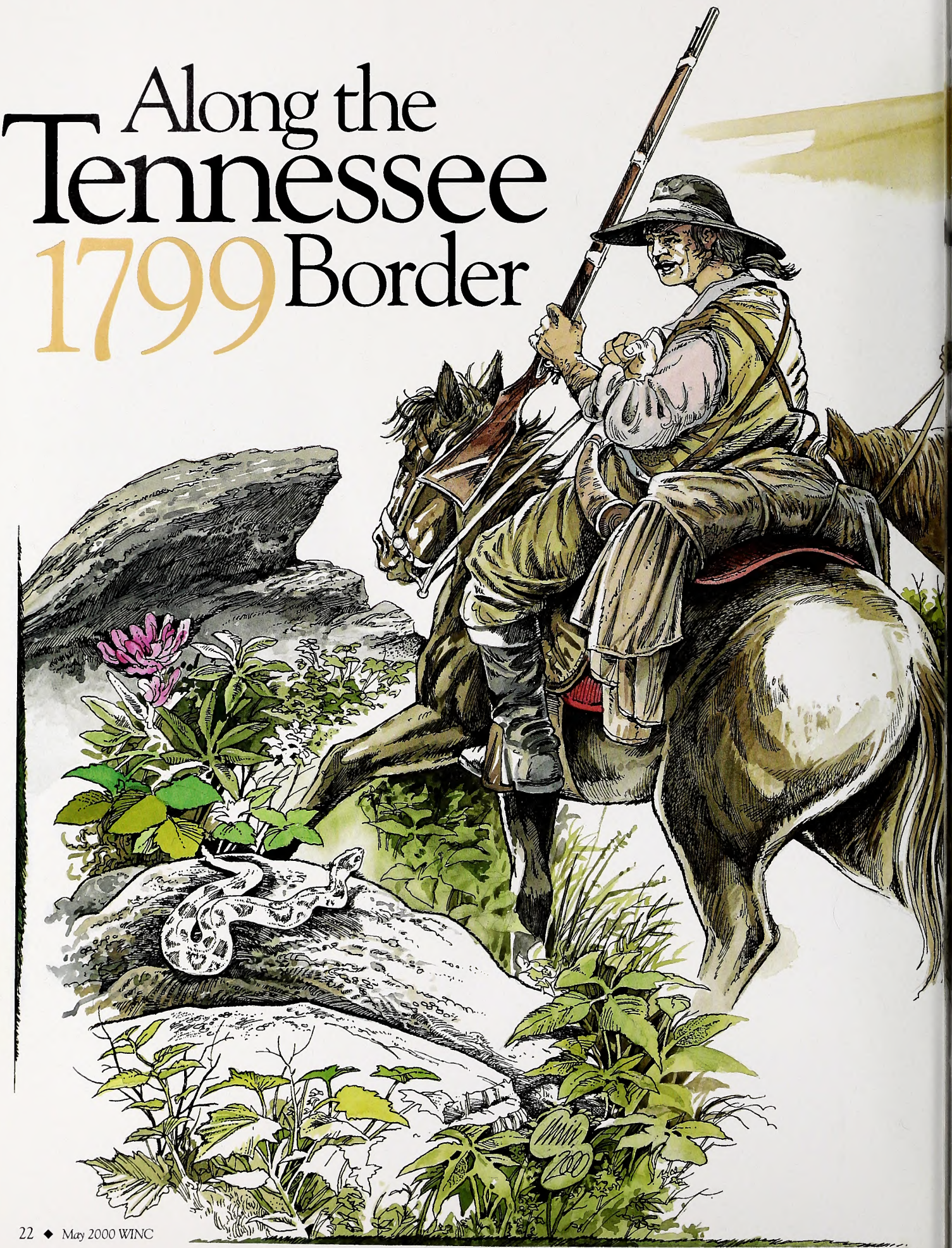
American coot

thick-billed murre

laughing gull

pine warbler

Along the Tennessee 1799 Border



Shortly after the Revolutionary War, state surveyors made their way up rocky trails and across steep gorges, from present day Ashe County to Cherokee Indian territory. The line they traced today separates North Carolina and Tennessee.

written by John Hairr ©2000
illustrated by Chris Armstrong ©2000

In 1789, North Carolina ceded to the federal government its western lands beyond the mountains in an effort to settle debts associated with the struggle for independence. This legislation led to the creation of Tennessee, and also led to a surveying expedition that explored the wild mountainous region along the western fringe of North Carolina south to Cherokee Indian lands.

Fortunately, two members of that expedition kept accounts of their journey through that rough terrain, and it's through their eyes that we are given a rare glimpse of what this remote area was like two centuries ago. In the leather-bound notebook where he recorded the angles and distances measured, surveyor John Strother also described the territory along the route and the hardships they encountered, and he provided insights into the personalities of several expedition members. The other surveyor, Robert Henry, kept an important chronicle of his own concerning the events of the expedition, though it was not as detailed as Strother's.

The legislation ceding the land was passed in 1789, but it was seven years before the General Assembly officially named members of a commission to mark the route of the boundary on the ground. Another three years were to pass before the commissioners actually started with their task.

By then, it was late April 1799, and the expedition members gathered at Capt. Isaac Weaver's house in what is now Ashe County. Henry and Strother were the surveyors on the expedition. Other commissioners included Col. Joseph McDowell, Col. David Vance

and Mussendine Matthews. McDowell and Vance had been prominent in western North Carolina since the Revolutionary War. Matthews was a popular leader who represented the people of Iredell County in the General Assembly. Maj. James Neely served as commissary; chain bearers included Maj. B. Collins, James Hawkins, George Penland, Robert Logan, George Davidson and John Matthews, son of Mussendine Matthews. In addition, there were two packhorse handlers whose names were not recorded.

On April 21, 1799, the group left Weaver's home and trekked along Stag Creek to Big Spring Mountain, then along the ridge to Pond Mountain and a meadow known as the "lower rye Patch." Here they rested briefly before proceeding to their camp at the base of Stone Mountain, which they ascended on the morning of April 22. Strother described the mountain as "very steep." The group then set up another camp at a place called the "upper rye patch."

While their companions were making their camp ready, Strother and a couple of chain bearers set off north along the ridge to look for the Virginia border, which they finally located after several hours' search. The site marked, described as being "in a low gap between the head of Horsepen Cr. Of New River + a branch of Laurel of Holston River 2 or 3 m s.w. from Whitetop Mountain," remains the spot where the states of North Carolina, Tennessee and Virginia intersect. After two centuries, the spot is still remote, though an all-terrain-vehicle trail that traverses the gap en route from White Top, Va., to Laurel Bloomery, Tenn., makes the spot somewhat more accessible today than it was when the corner was set.

The starting point established, the surveyors ran the first section of the boundary line along the top of Stone Mountain back to camp. Upon returning, the men "feasted suptuously on stewed venison + Bacon," while the rest of the party went off to inspect the line.

The next morning, April 23, the group moved south along the ridge separating the waters of two Laurel Creeks—the one in Tennessee, a tributary of the Holston River, and the one in North Carolina, a tributary of the New River. Strother described this section as "extreme rough ground and some bad Laurel thickets." They halted at what is now called Payne Gap and made camp for the evening.

Their evening at Payne Gap was anything but pleasant. A windstorm struck, scattering the horses and forcing the men to round up the animals before breakfast. Following their morning exercise, the surveyors continued charting the boundary line south until they came to a hollow, which offered an abundant water supply and forage. Here they stopped briefly to rest before pressing onward, only to be halted shortly by a powerful rainstorm. The group hastily prepared a camp and spent a damp evening.

The next morning, the surveyors proceeded only a short distance with the line before the rain returned and compelled them to seek shelter in a hastily erected camp on Roundabout Creek.

The weather cleared, and on Monday the group was ready to proceed with the line. Strother noted, "A fine pleasant morning set out on the line at 7 o.c. and continued 1 1/2 miles to the top of a high Knob from which the mns Appear in every direction high and craggy the view is wild and romantic, yet the greatest part of the mts. Through which we passed for some miles back are very rich + covered with rich Herbage the timber generally Sugar tree + Buckeye." The peak thus described is Leander Mountain, elevation 4,350 feet.

On April 30, the surveyors were making slow progress west along the

Journey *Across* the Frontier

For five weeks, beginning on April 21, 1799, a survey party and its pack animals toiled up mountains, plunged down gorges and forded raging rivers to lay the line that today separates North Carolina and Tennessee.

FROM THE PRICE-STROTHER MAP OF 1808.

ridge that today is aptly called State Line Ridge. Rain hampered their work, and the group encountered swarms of "Gnats," or blackflies, which plague outdoorsmen in this region during the spring. By May 1, they had made their way back up onto the main ridge of the Stone Mountains and encamped at a place known as Star Gap.

On Saturday, May 2, Strother recorded the group's first eventful encounter with the reptiles of the mountains. As they proceeded along the high ridge, the surveyors disturbed a rattlesnake. "In the course of one [mile] seen a very large Rattle bug. Attempted to kill it, but it was too souple in the heels for us."

Later in the day, the party reached one of the major landmarks mentioned in the Act of 1789. The law stipulated that the boundary run along the extreme height of Stone Mountain "to the place where Wataugo River breaks through it, thence a direct course to the top of Yellow Mountain, where Bright's road crosses the same." Thus, the surveyors took several readings from the southwestern corner of the summit of the mountain and plotted a course to Yellow Mountain before descending into the Watauga River Gorge.

As the Watauga cuts across the state line, the river flows through a deep, rugged gorge filled with boulders, rapids and waterfalls. Descending in some sections at a rate of 200 feet per mile, the waters in the Watauga Gorge even today challenge whitewater enthusiasts equipped with their rubber rafts and kayaks. How the members of the survey party in 1799 negotiated the crossing of the river is unknown.

As the men went into camp on the south side of the Watauga, one of them killed a bear. Strother commented upon this fortuitous event. "One of our party turned out and killed a two year old she-bear, very poor, upon which and some bacon Stewed together with some good Tea and Johnny Cake we made a Sabbath morning's breakfast fit for a European Lord."

By May 5, following three days of grueling work, the party was at the base of Yellow Mountain, at which point Maj. Neely was sent into the settlements along Doe River for much-needed supplies. The straight-course line had carried the group across the mountains and down into valleys instead of along the ridgeline.

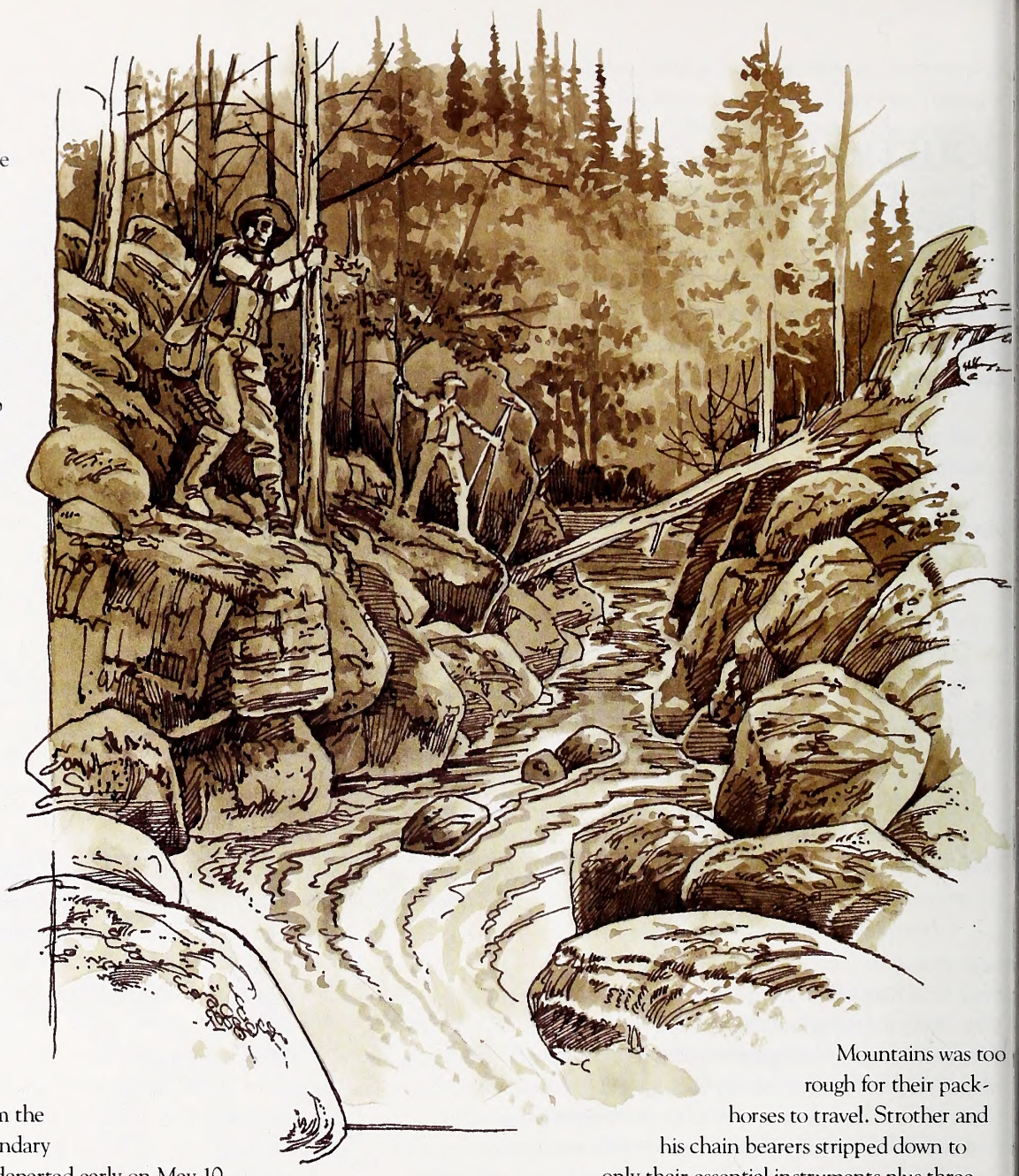
The next day, the group carried the line up Yellow Mountain. Strother observed, "The Trees at this place is just a creaping out of their winters garb." As a storm broke, they made their camp on Yellow Mountain at the head of Roaring Creek, where the road "from Morganton to Jonesborough" crossed the mountain. Strother and Hawkins were lured away by the comforts offered at a Mr. Curry's place down along Roaring Creek, where they enjoyed a warm supper and a dry bed.

The two men returned to their companions, and on May 8 the surveyors ran the line across the top of Roan Mountain, "to a low gap therein where we encamped at a pleasant Beach flat + good Spring." The Roan, elevation 6,285 feet, was perhaps the most notable mountain peak the expedition passed. It is fortunate that they arrived at this place on a Saturday afternoon, as their self-imposed prohibition against working on Sunday gave them an excellent opportunity to investigate the peak.

"Spent the Sabbath day in taking observations from the high spur we crossed," recorded Strother, "in gathering the fir Oil of ye Balsam

of Pine which is found on this mountain, in collecting a root said to be an excellent preventative against the bite of a Rattle Snake and in viewing the wonderful scene this conspicuous Situation affords. There is no Shrubbage grows on the tops of this Mn. for several miles say 5. The wind Has such power on the top of this Mountain that the ground is blowed up in Deep holes all over the North West side. The prospects from the Roan Mn is more conspicuous than from any other part of the Appalatchen Mns."

Despite its remoteness, Roan was one of the most studied mountains in the region. In 1794, noted French botanist Andre Michaux had made the first of several trips to this high peak. Another botanist, John Fraser, the Scottish discoverer of the Fraser fir, also studied Roan's plants. These scientists were the first in a long line of scientists who continue to explore what The Nature Conservancy says is one of the most biologically diverse peaks in the Appalachians.



After making several observations of other peaks from the top of Roan Mountain, the boundary commissioners and their group departed early on May 10 and headed north-northwest for a peak now known as Little Rock Knob. From there they headed for Iron Mountain, which they reached on May 11. The party named their camp at this place Camp Strother.

On the morning of May 12, Col. Vance and Maj. Neely departed for the settlement at Limestone, Tenn., in search of a new guide. By 2 p.m. they rejoined the group, who in their absence had carried the line along the summit of Iron Mountain. The trip to Limestone had been a success in more ways than one, as they brought along "a Mr. Collier as Pilate & two gallons whiskey. We stopped, drank our own health & proceeded on the line," Strother recorded. After cutting their way through a laurel thicket to a spur of Unaka Mountain, the party halted for the evening amongst the rocks and thick vegetation. Strother wrote, "Night came on we turned off and camped at a very bad place, it being steep Laurelly hollow, but the whiskey had such maraculous powers that it made the place tolerably comfortable."

Before continuing with the survey, the men were informed by their new guide that the terrain across the main ridge of the Unaka Mountains was too rough for their packhorses to travel. Strother and his chain bearers stripped down to only their essential instruments plus three days' provisions and set out on foot across the Unakas. Meanwhile, the rest of the group headed around the toughest part of the Unakas to a point farther along the ridge, where a trail from Hollow Poplar to Greasy Cove crossed the mountains.

The going for Strother and his chain bearers was, as predicted, rough at first, as they were hampered by steep terrain and dense vegetation. But in the gap near the head of Hollow Poplar Creek, they unexpectedly broke free of the dense vegetation and were able to rejoin their companions on the evening of May 14, ahead of schedule. This convinced Strother that Collier, the guide, was unacquainted with the territory, and despite the fact that he had brought much mirth to camp with the two gallons of liquid refreshment, Collier was dismissed.

The Nolichucky River, another important landmark specified in the legislation, was reached on May 15. Before descending into the river gorge, the surveyors took several observations and established their course southwest to Bald Mountain. The party then divided once again, as they believed it would be impractical to try to take

their pack animals across the rugged terrain. This time it was Henry's turn to hike through with the chain bearers, while Strother accompanied the rest of the party on a more circuitous but less vertical route to Big Bald Mountain.

The boundary crosses the Nolichucky at State Line Shoals, one of a series of rapids in the Nolichucky Gorge that makes this section of the river popular with whitewater enthusiasts. From the river, Henry's party would have followed Devils Creek and passed its picturesque waterfall. Even today there is a path to this cascade from the mouth of the creek, well worn by boaters who stop for a chance to stretch their legs and visit the falls.

Unfortunately, Henry left no account of his journey from the Nolichucky Gorge to Bald Mountain. He finished the next day, which was a Sunday, but took Monday off perhaps to observe their restriction of not working on the Sabbath.

From Big Bald Mountain, the surveyors pressed onward with the boundary line. Their route took them southwest to Sam's Gap. From there they headed in a northerly direction across the summit of Sugarloaf Knob and encamped in Boon's Cove, where they spent a pleasant evening.

In the days following their stay at Boon's Cove, the party encountered some of the most difficult terrain of the entire expedition. The route of their line took them north to Flint Mountain, then northwest where they crested the main ridge of the Bald Mountains. Progress was slow, gnats were troublesome and provisions for man and beast began to run low.

On Saturday, May 22, Strother wrote of their troubles. "The horses look very bad. Cut our way up to ye top of the Mn & proceed on with the line 1¼ M. Was four hours & 23 mts going this distance. Got through the laurel and came into an open flattop Beach Mn. Where we encamped till Monday at a good spring & excellent range for our horses."

Fortunately for the men, the ever resilient Maj. Neely rejoined the party on May 24 at the gap at the head of Little Laurel Creek. Perhaps he brought back word that the surveyors were nearing their destination, for in the days following, they twice hastily took off on the wrong ridge and were forced to backtrack. Of the final mishap of this part of the trip, Strother recorded, "The commissioners being anctuous to get on to the Painted Rock started early. Went on with the line a wrong ridge and fell in another fork of Paint Cr. Returned & encamped on the right ridge where we spent our time uncomfortable this evening."

Finally, on May 28, the boundary commssioners arrived at the Paint Rock on the French Broad River. Strother provided the most accurate and detailed description of this famous place. "Measured the height of the rock & found it to be 107 feet 3 inches high from top to the base. It rather projects over the face of the rocks; bears but few traces of its having formerly been painted, owing to its having been smoked by pine knots and other wood from a place at its base where travelers have frequently camped. In the year 1790 it was not much smoked; the pictures of some humans, wild beasts, fish & fowls were to be seen plainly made with the red paint, some of them 20 & 30 feet from its base."

Their journey over for the time being, the members of the expedition headed upstream to the Warm Springs, now known as Hot Springs in Madison County. The facilities at the thermal springs must have been a welcome luxury to the members of the party, who had been trekking through the woods for six weeks.

A note in the Secretary of State's Boundary Papers signed by commissioners Matthews, Vance and McDowell shows that they took the line south beyond the French Broad "twenty eight Miles and twenty poles to the pinnacle of the Smoky Mountain where we stopped not knowing where the Indian Treaty line will run." This would have put them somewhere in the vicinity of Mount Sterling, now in Haywood County, near the edge of the then-sovereign Cherokee nation.

Exactly when they continued the line south is unknown, but it was not in late May 1799. On May 29, the members of the expedition departed Warm Springs and headed home. Strother remained behind, enjoying the relaxing atmosphere and the 100-degree water. The final entry in his journal of the boundary survey notes, "The company set out for home to which place I wish them a safe arrival and happy reception. As for myself, I stay at the Springs to get clear of the fatigue of the Tour." ⊠

Exploring the Boundary LINE *today*

After two centuries, it is still possible to experience the remote region along the North Carolina-Tennessee border through which the boundary commissioners passed.

For the truly adventurous, a stroll along the Appalachian Trail will put you literally in the footsteps of the boundary commissioners. For nearly 80 miles north from Hot Springs, the Appalachian Trail follows the state line, except for an occasional detour.

For those who lack the time to make such an extended visit, the route can be sampled at various places where highways cross the state line. Roan Mountain is the most accessible of the high peaks along the route. A paved road leads from Carver's Gap to parking areas along the summit. Once on top, visitors will find rest rooms, rhododendron gardens and, in season, an information center.

At the southern end of the route, a scenic ride along the French Broad River leads to Paint Rock, where the U.S. Forest Service has built a parking area to accommodate visitors. Explore the rock for its natural beauty, as the man-made petroglyphs have long since disappeared.

Finally, it is still possible to enjoy the hospitality of the Warm Springs, now known as Hot Springs, where members of the expedition recuperated. Visitors can enjoy Jacuzzis filled with the 100-degree mineral water. The area also has camping sites and rental cabins. For more information, call (828) 622-7676.

Listen! A strange gobbling sound booms across a meadow early on a spring morning. Tails fanned wide and heads held high, stocky males strut proudly to attract their mates.

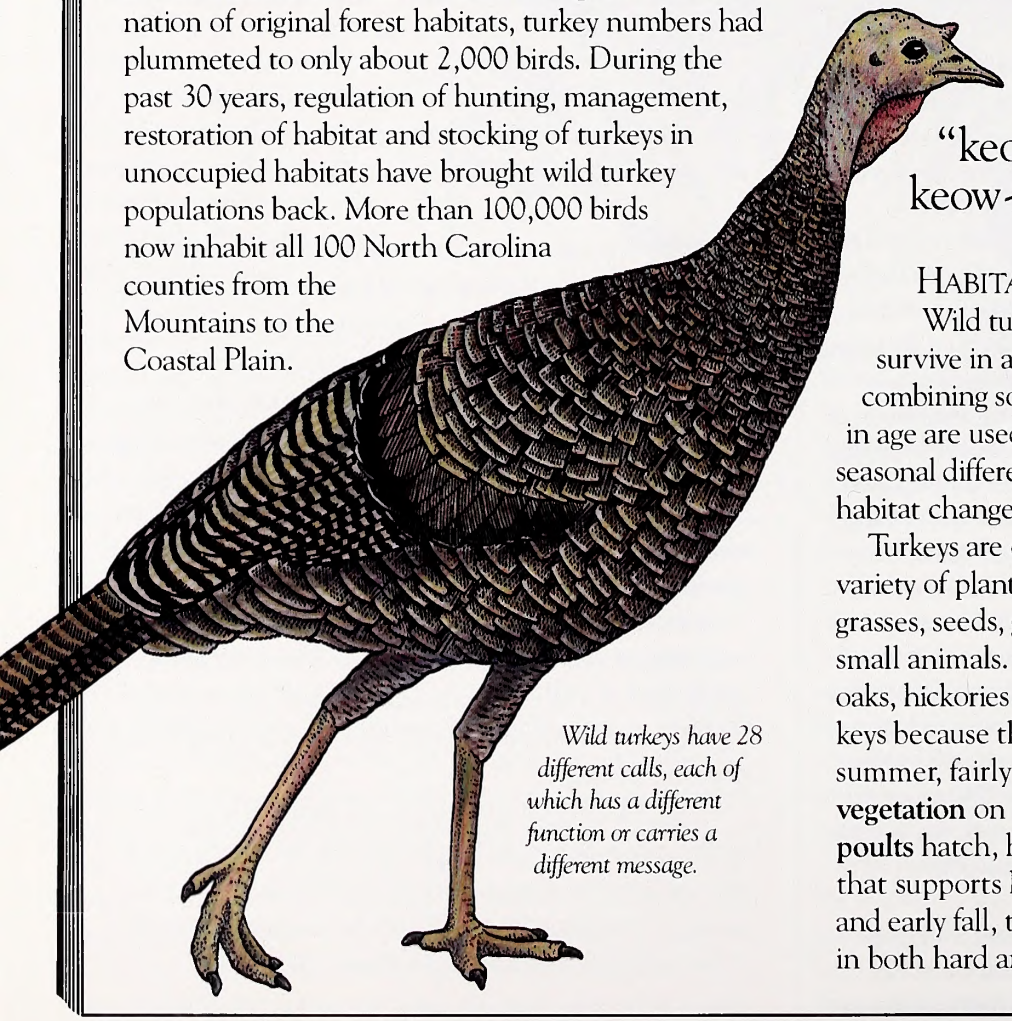
"humump! hmmmmmm"

Magnificent Wild Turkeys

written by David T. Cobb / illustrated by Consie Powell

UPS AND DOWNS

In colonial days, wild turkeys were common in North Carolina. But by 1970, due to decades of unrestricted hunting and the elimination of original forest habitats, turkey numbers had plummeted to only about 2,000 birds. During the past 30 years, regulation of hunting, management, restoration of habitat and stocking of turkeys in unoccupied habitats have brought wild turkey populations back. More than 100,000 birds now inhabit all 100 North Carolina counties from the Mountains to the Coastal Plain.



Wild turkeys have 28 different calls, each of which has a different function or carries a different message.

"keow-keow-keow-keow- keow-keow-keow"

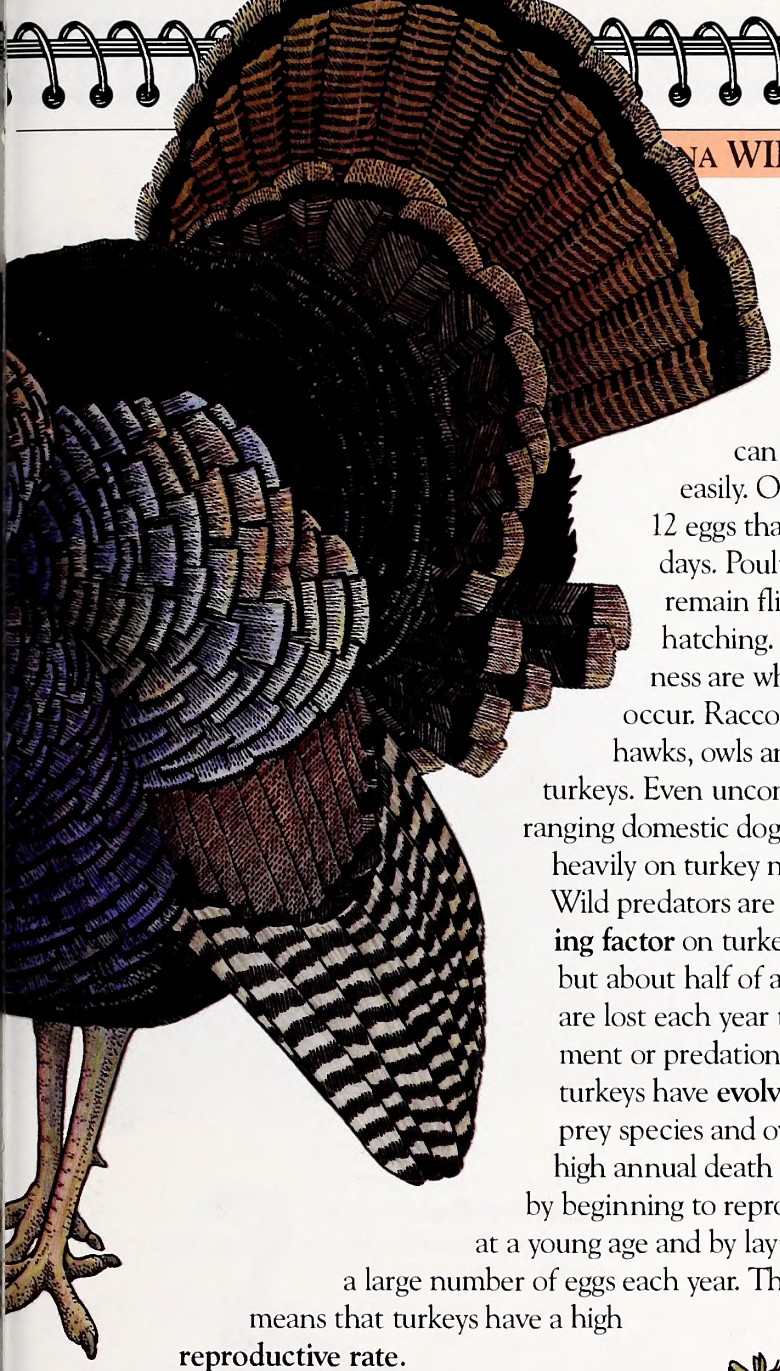
HABITAT SELECTION

Wild turkeys are very adaptable and can survive in a wide variety of habitats. Habitats combining some open area and forests that vary in age are used most often. Social behavior and seasonal differences in food requirements determine habitat changes from season to season.

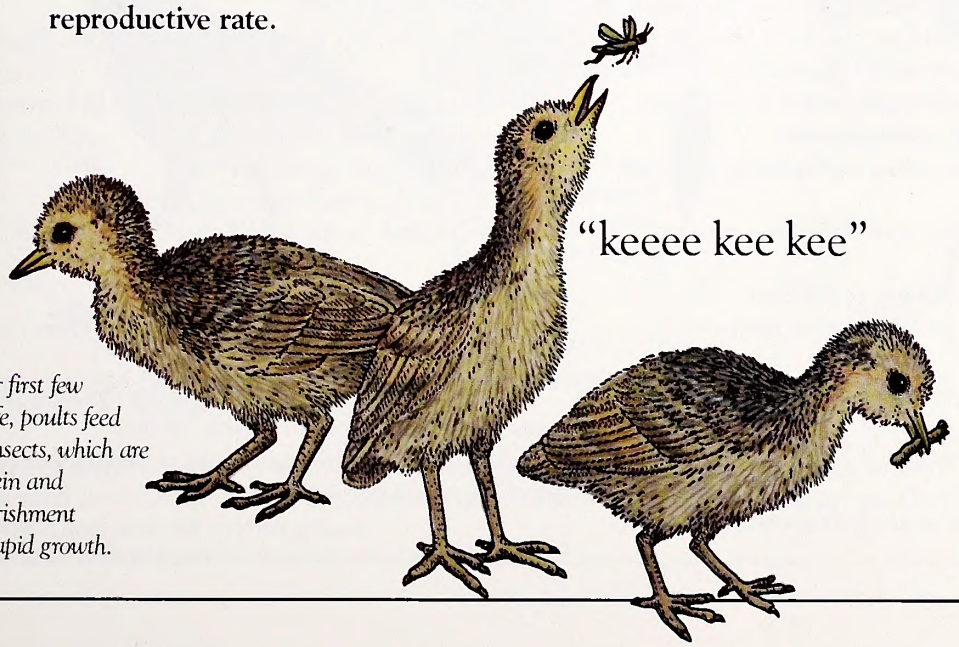
Turkeys are **opportunistic omnivores**; they eat a variety of plants and animals including **mast**, buds, fruits, grasses, seeds, green vegetation, insects, snails and other small animals. During winter, hardwood forests with oaks, hickories and beech trees are heavily used by turkeys because they provide hard mast. In the spring and summer, fairly open habitat with thick **herbaceous vegetation** on the ground is preferred for nesting. Once **poults** hatch, hens move **broods** to areas with vegetation that supports high insect populations. In late summer and early fall, turkeys feed in a variety of habitats plentiful in both hard and soft mast.

NESTING

In North Carolina, turkeys begin nesting from mid-April through mid-May. Nests are on the ground, usually close to a tree, stump or bush. The hen chooses an area where she can see all around while sitting on her nest and can move on and off the nest easily. On average, a turkey hen lays 12 eggs that she incubates for 28 days. Poults are **precocial** but remain flightless for 14 days after hatching. These days of flightlessness are when most turkey deaths occur. Raccoons, foxes, bobcats, hawks, owls and snakes all prey on young turkeys. Even uncontrolled **feral** or free-ranging domestic dogs and cats can prey heavily on turkey nests and poults. Wild predators are seldom a **limiting factor** on turkey populations, but about half of all turkey nests are lost each year to abandonment or predation. However, turkeys have **evolved** as a prey species and overcome high annual death rates by beginning to reproduce at a young age and by laying a large number of eggs each year. This means that turkeys have a high **reproductive rate.**



"whit...whit...
whit-whit-whit
whit...whit...whit...
whit-whit"



"keeee kee kee"

During their first few months of life, poults feed heavily on insects, which are high in protein and provide nourishment needed for rapid growth.

Disturbance is a critical factor in determining whether turkeys use an area. Turkeys are highly mobile and secretive. Frequent disturbance by human activities will often result in abandonment by turkeys of an otherwise perfect habitat.

SOCIAL STRUCTURE

Turkeys have a highly developed social structure that changes seasonally. Single-sex winter flocks break up in the early spring as breeding season begins. During the breeding season, temporary groups with turkeys of different ages and sexes are common. Outside of the breeding season there are four basic types of wild turkey flocks. In summer and early fall, *family flocks* include hens with poults. Adult and juvenile hens from these family flocks often remain together throughout the winter. Hens that have been unsuccessful in nesting form *adult hen flocks*. *Adult gobbler flocks* are made up of male turkeys over one year in age. *Juvenile gobbler flocks* are formed in late fall when young males leave family flocks.

What Does It Mean?

opportunistic omnivore: an animal that feeds on both plants and other animals depending on their availability

mast: seeds and fruit produced from trees and other woody vegetation. Hard mast includes acorns, hickory nuts and other hard seeds. Soft mast is produced from plants like blueberries, blackberries, wild cherries, pawpaws and dogwoods

herbaceous vegetation: plants that do not develop woody tissue and die back at the end of each growing season

poult: a wild turkey chick from the moment of hatching until it is 4 weeks of age

brood: the group of birds that hatch at the same time from an individual nest

precocial: highly independent at the time of hatching

feral: a state of wildness found in free-ranging but once domesticated animals

limiting factor: a condition that prevents a population of animals from increasing to their fullest potential

evolved: developed under environmental pressures over many generations

reproductive rate: the annual rate at which a population produces young

Read and Find Out

- *Wild Turkey, Tame Turkey* by Dorothy Hinshaw Patent, Clarion Books, 1989.
- *The Wild Turkey: Biology and Management* by James G. Dickson, Stackpole Books, 1992.
- *The Book of the Wild Turkey* by Lovett Williams, Winchester Press, 1981.
- *The Voice and Vocabulary of the Wild Turkey* by Lovett Williams, Real Turkeys, 1984.

In *Wildlife in North Carolina*

- "Full Circle" by Mike Seamster, April 1994.
- "A Dizzy Climb for the Wild Turkey" by Jeff Samsel, April 1998.

It's WILD!

Project WILD Activities for teachers and students that correlate to this topic include:

Planting Animals: teaches students about introduction or reintroduction of animals to suitable habitat.

Turkey Trouble: teaches students about limiting factors for the growth of wildlife populations.

Editing and design by Consie Powell. Art puzzle by Anne Marshall Runyon.

Get Outside

Look for turkey sign: With turkeys again distributed across the state, it is fairly easy to find a tract of federal, state or private land that holds a flock of wild turkeys. In the winter look for circular scratching on the ground where turkey have searched for food. Also, look for turkey tracks and feathers. Although turkeys are often difficult to see themselves, their sign should be easy to find in an area with an established population.

Listen for a wild turkey gobbler: Identify a tract of land with an established turkey population to which you can gain access early on a spring morning. If you are out before daybreak, you should be able to hear a turkey gobble just at daybreak as the other birds begin to call. If you think there are birds in your area, but you don't hear gobbling, try calling with a commercially available "owl hooter." They can be used to stimulate turkeys to gobble. *But remember, peaks in turkey gobbling in the spring correspond to turkey hunting season. Always get permission from the landowner before entering anyone's property and be mindful of local turkey hunters.*

Get WILD

Advanced WILD Workshops:

May 2-3 – *Field Ecology*, Hanging Rock State Park. Contact Jaye Dow (336) 593-8480.

May 6-7 – *Migratory Songbirds*, Howell Woods Environmental Learning Center, Four Oaks. Contact Howell Woods, (919) 938-0115.

May 20-21 – *Migratory Birds*, Cradle of Forestry, Pisgah Forest. Contact Cindy Carpenter, (828) 877-3130.

May 23-24 – *Stream Ecology*, Crowders Mountain State Park. Contact park office, (704) 853-5375.

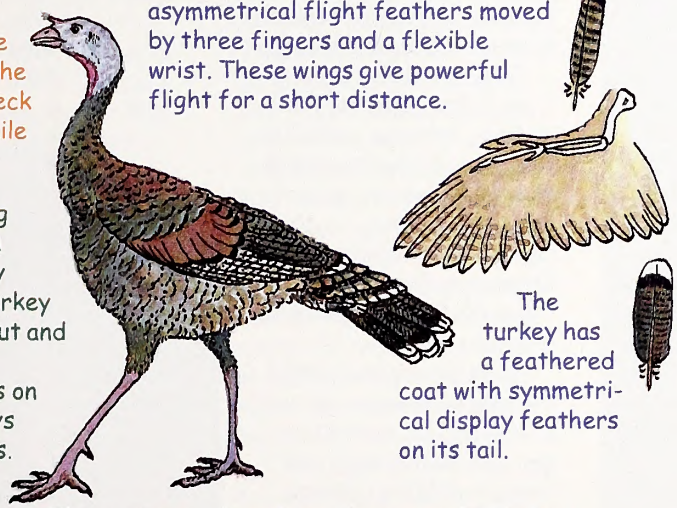
June 2-3 – *Foxes, Wolves, Coyotes*, SciWorks Environmental Center, Winston-Salem. Contact Kelli Johnson, (336) 767-6730.

June 19-20 – *Mountain Stream Ecology*, Pisgah Center for Wildlife Education. Contact program coordinator, (828) 877-4423.

July 11-12 – *Wildlife Technology*, North Carolina Forest Service Training Center, Crossnore. Contact T.M. Lemon, (336) 957-4382.

Body Plans for a Modern Ground Bird and its Ancient Cousin

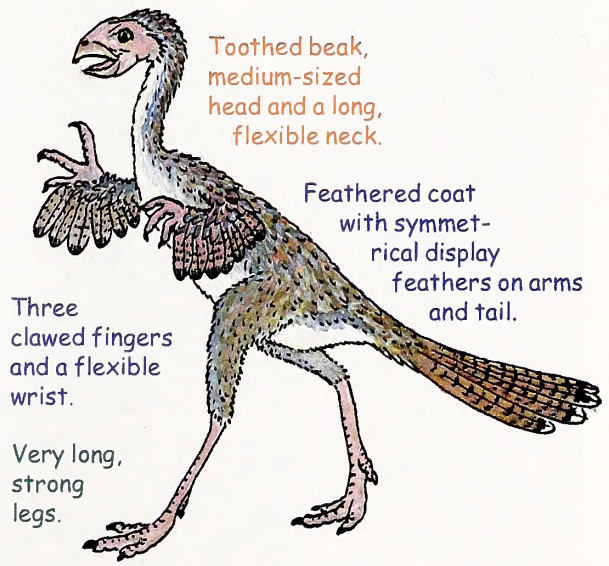
Wild Turkey



Three strong, clawed toes can spread wide for balance and scratch for food. The short fourth toe turns backward allowing the turkey to grip branches and roost in trees.

The turkey belongs to the order *Galliformes* (which mean chicken-shaped ground bird). Other *Galliformes* native to North Carolina are the bobwhite quail and the ruffed grouse.

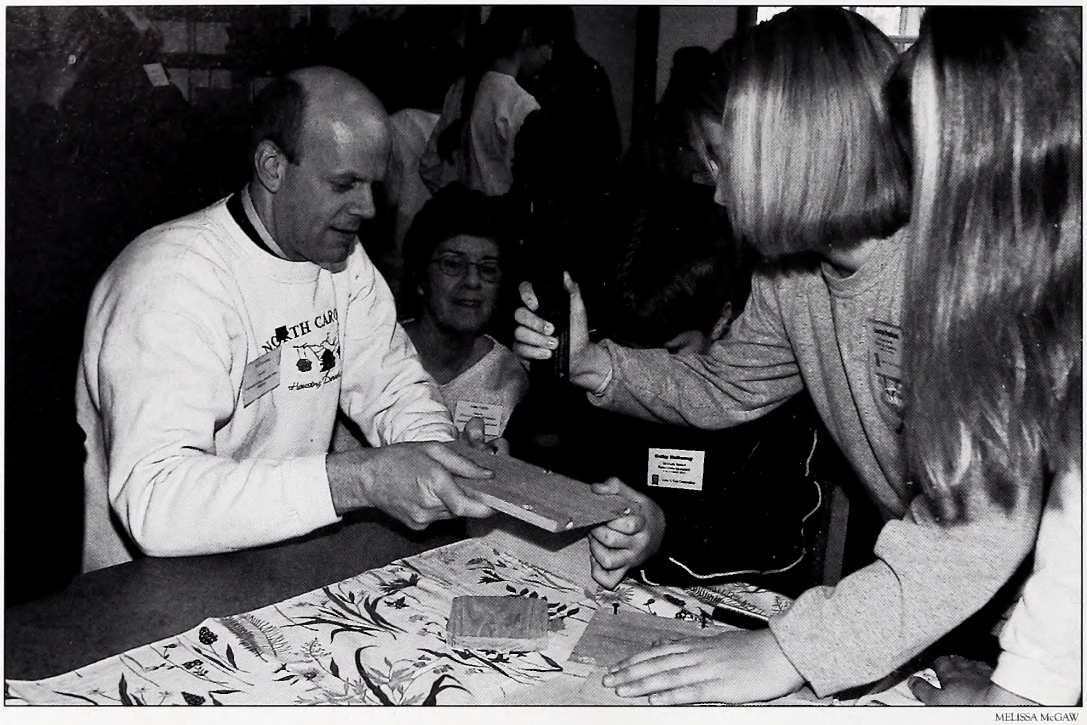
Caudipteryx Zoui



Three powerful clawed toes and a smaller fourth toe.

Fossils of this flightless predator were found in China in 1997. It lived 120 million years ago during the Cretaceous Period.

North Carolina Bluebirds Get 6,500 New Homes



MELISSA McGAW

***Bill Holman, secretary** of the N.C. Department of Environment and Natural Resources, helps children at Timber Drive Elementary School in Garner to assemble a bluebird nest box. More than 6,500 nest box kits were supplied to North Carolina school children through the Love A Tree program.*

Bluebirds will have a much easier time calling North Carolina home, as a result of this year's Love A Tree environmental education program, which is being sponsored by a number of public and private partners from across the state.

As part of the 2000 Love A Tree program, surplus shipping pallets were turned into 6,500 bluebird nest box kits and made available to schools and environmental education centers statewide. After picking up these kits, educators were encouraged to help their students assemble the boxes and place them in appropriate locations, where they can be found and used by bluebirds.

To educate the children about bluebird biology, proper nest box placement and maintenance, each Love A Tree package contained a copy of the January issue of *Wildlife in North Carolina*, which features bluebirds and other cavity nesters. The package also contains a copy of the N.C. Bluebird Society's *Bluebird Tips* as well as other educational materials. These materials provide the tools necessary to help educate students about the interrelationships among river basins, habitats, wildlife and humans.

To help launch the 2000 Love A Tree program, Bill Holman, secretary of the Department of Environment and Natural Resources, recently assisted students at Timber Drive Elementary School in Garner in building a bluebird nest box.

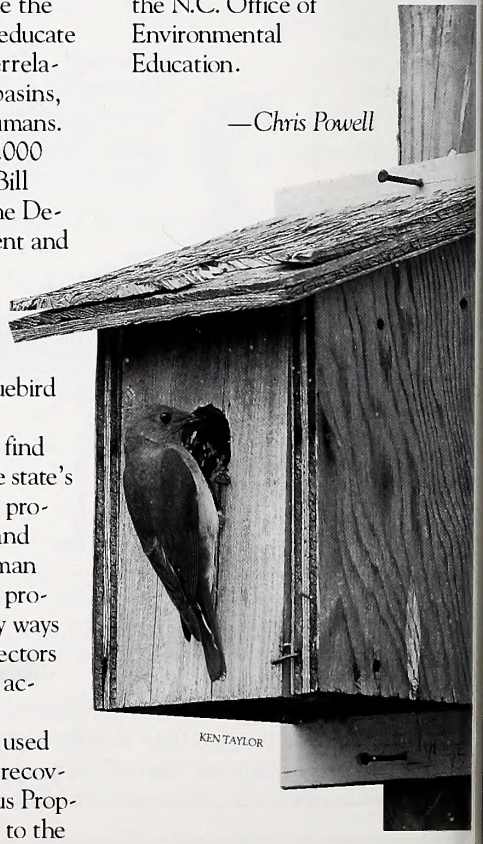
"Our challenge is to find the balance between the state's growth and the need to protect our environment and conserve wildlife," Holman said. "The Love A Tree program is just one of many ways the public and private sectors are working together to accomplish that goal."

The shipping pallets used for the nest boxes were recovered by the N.C. Surplus Property Office and shipped to the Harnett Correctional Institution in Lillington, where the boards were cut, drilled and packaged. Hardware for the kits was donated by various North Carolina businesses.

The Love A Tree program is a partnership among the following organizations: Edwards Wood Products, International Paper, Kinko's, North American Bluebird Society, N.C. Bluebird Society, N.C. Wildlife Federation, Sears Industrial Sales and Wilders Incorporated.

North Carolina governmental partners included: Central Carolina Community College, Department of Administration, the Department of Correction, the Department of Environment and Natural Resources, the Department of Public Instruction, the Department of Transportation and the N.C. Wildlife Resources Commission. The program is coordinated by the N.C. Office of Environmental Education.

—Chris Powell



KEN TAYLOR

Edited by Chris Powell

Another Record Year for N.C. Hunters for the Hungry Program

During the 1999 deer season, hunters donated more than 50,000 pounds of venison to N.C. Hunters for the Hungry Inc., surpassing the organization's 1998 total by 5,000 pounds.

To date, this nonprofit group has collected more than 225,000 pounds of deer and distributed it to churches, soup kitchens, crisis shelters, orphanages and other hunger-relief organizations.

Through the program, hunters can donate legally harvested deer to participating meat processors across the state. The venison is then ground, packaged and distributed to churches, soup kitchens, crisis shelters and other hunger relief organizations. Hunters for the Hungry reimburses processors a flat rate of $30 per deer, with allowances made for portions of deer donated, such as $15 for half a deer. Annual meat-processing costs typically exceed $20,000 a year.

NORTH CAROLINA HUNTERS FOR THE HUNGRY

Taking Aim Against Hunger

Meat is a highly desired commodity because most food donations consist of canned goods, various perishables and other staples, said Ernie Seneca, president of the volunteer group.

"Cost is probably the biggest reason more meat is not donated," Seneca said. "Hunters for the Hungry is helping fill that void. Venison is low in fat and it's an excellent source of protein. Every community has people needing help, and this program is a great way for hunters to share an abundant natural resource with those less fortunate."

During recent years, the program has received an infusion of volunteers and support. Now overseeing operations for Hunters for the Hungry, the Wake County Wildlife Club was able to raise $5,800 at its fourth annual benefit auction held at this year's Dixie Deer Classic, in Raleigh.

—Courtesy of the N.C. Chapter of Hunters for the Hungry Inc.

Federation Honors Wildlife Officer, Biologist and Magazine

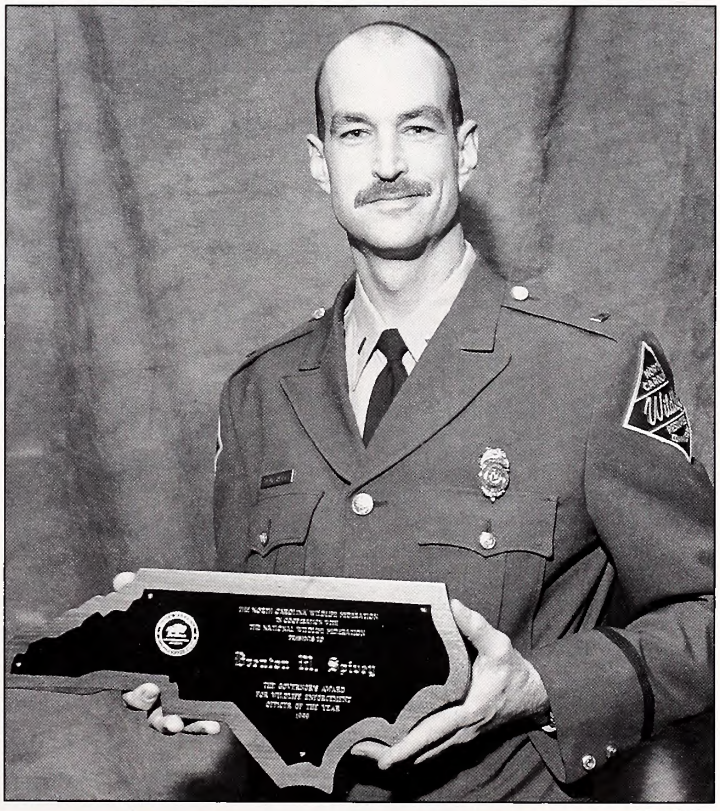
Brent Spivey, a lieutenant with the N.C. Wildlife Resources Commission's Division of Enforcement; Mark Johns, the Wildlife Commission's Partners in Flight Coordinator; and *Wildlife in North Carolina* magazine were recently honored by the N.C. Wildlife Federation.

Spivey, of Fayetteville, received the 1999 Wildlife Officer of the Year award during the Wildlife Federation's Governor's Awards banquet, held recently in Raleigh. Spivey started working for the Wildlife Commission in 1987 and currently works in District 4, which includes the counties of Harnett, Sampson, Bladen, Cumberland, Hoke, Scotland, Robeson, Columbus and Brunswick.

In addition to his numerous daily duties, Spivey has especially excelled in public outreach. Two years ago, he voluntarily started his own television show on Fayetteville's community cable-access station, called "North Carolina Wildlife Journal."

"I have tremendous respect for the people of North Carolina and for those I work with in the Wildlife Commission," Spivey said. "We are all working toward our goal of protecting the future of our state's wildlife. One of the greatest tools that we as both officers and citizens can utilize is education."

***Brent Spivey,** a wildlife officer with the N.C. Wildlife Resources Commission, was recently chosen as Wildlife Officer of the Year by the N.C. Wildlife Federation.*



STEVE WILSON

Johns, of Cary, received the 1999 Wildlife Conservationist of the Year award. An employee with the Wildlife Commission since 1998, Johns was recognized for his tireless work interacting with top-flight researchers and scientists to promote bird conservation through the Partners in Flight Program.

"I feel lucky to have a job that is so interesting and fun, and luckier still that I get excited when my Mom and Dad call me on the phone to tell me that the owl is back calling behind the house," Johns said.

In addition, the staff of *Wildlife in North Carolina* magazine received the Wildlife Federation's 1999 Conservation Communicator of the Year award.

The magazine was recognized for the November 1999 special "Rivers of North Carolina" issue. The unprecedented, 128-page issue covered every river basin in the state, featuring the history and environmental importance of rivers as well as the people who are working to restore them.

—Chris Powell

North Carolina Outdoor Calendar of Events

On several occasions, events in this calendar have been changed without notice. Readers should check with the contact listed before traveling to an event. Items for listing should be conservation oriented and should be sent at least four months in advance.

May 13

The Pisgah Center for Wildlife Education, located near Brevard, will conduct the Eco-Explorers—Wildflowers program 9 a.m. to 11 a.m. Eco-explorers is a program series for children, ages 8 to 13. Each program focuses on a different eco-investigation that engages children with the natural world. (828) 877-4423.

May 20

The Pisgah Center for Wildlife Education, located near Brevard, will conduct the 'Tis the Season for Wildflowers program 9 a.m. to noon. Beginners, ages 16 and up, will learn to identify spring wildflowers using *Newcomb's Wildflower Guide*. The guide will be available for purchase at the wildlife center.

May 27

The Pisgah Center for Wildlife Education, located near Brevard, will conduct the Birding for Birders program 9 a.m. to 12 p.m. Designed for participants ages 12 and up, this program consists of a brief slide presentation followed by a bird walk around the wildlife center.

The following events will be held in conjunction with International Migratory Bird Day, which will be celebrated May 8.

May 11

Lake Mattamuskeet National Wildlife Refuge, in Hyde County, will conduct a prothonotary nest box check beginning at 8 a.m. (252) 926-4021.

May 13

- Pocosin Lakes National Wildlife Refuge and Partnership for the Sounds, in Columbia, will conduct an Inside and Out bird program beginning at 10 a.m. (252) 796-1000.
- Blue Jay Point County Park, Wake County, will conduct a Songbird Celebration program 7 a.m. to 2 p.m. (919) 870-4330.
- Cool Springs Environmental Education Center, in New Bern, will conduct a birding tour 9 to 11 a.m. (252) 633-7698 Ext. 4017.
- Eno River State Park will conduct a Birdwatching 101 program beginning at 8:30 a.m. (919) 383-1686.
- N.C. Zoological Park, in Asheboro, will conduct the 4th Annual International Migratory Bird Day Celebration 9 a.m. to 5 p.m. (336) 879-7000.
- The Reedy Creek Nature Preserve and Environmental Center, in Charlotte, will conduct an International Migratory Bird Celebration 7 a.m. to 4 p.m. (704) 598-8857.
- The Falls Lake State Recreation Area, in Holly Point, will conduct the Birding for Kids program 10 a.m. to 11:30 a.m. (919) 676-1027.

May 20

- The Cradle of Forestry, located in the Pisgah National Forest, will conduct an International Migratory Bird Day Celebration. (828) 877-3130.
- The Roanoke/Cashie River Center, in Windsor, will conduct the Birding the Cashie River program 8:30 a.m. to 1 p.m. (252) 794-2001.

Field Notes

Wild Turkey (bearded birds only)	Through May 6
Hatchery-Supported Trout Waters	Open
Wild Trout Waters	Year-Round
Delayed Harvest Trout Waters (catch and release)	Through June 2

Information on bag limits and other regulations may be found in the *1999-00 North Carolina Inland Fishing, Hunting & Trapping Regulations Digest*. For a copy, check with license agents or contact the N.C. Wildlife Resources Commission at (919) 733-7291.

NORTH CAROLINA Wildlife RESOURCES COMMISSION

Trappers Hold Educational Program

Those interested in learning the time-honored profession of trapping are invited to attend the North Carolina Trapper's Association's Trapper Education program, to be held 8 a.m. May 20.

Modeled after the Wildlife Commission's hunter safety course, the trapping program is designed for ages 12 and older, covering a wide range of topics. The morning sessions will include the history and heritage of trapping, furbearer identification and habits, trapping and wildlife management, trapping ethics, laws and regulations, trapline equipment and safety. The afternoon field sessions will involve basic trap sets, proper pelt preparation and a visit to a professional trapper's shed. Also, a certificate can be obtained by passing a written test at the end of the day.

"The Trapper Education Program is a unique opportunity for those wishing to learn the trade or enhance their existing knowledge to meet and learn from professional trappers," said Dave Woodward, a member of the Trapper's Association.

The program will be held at the clubhouse of the Wake County Wildlife Club off N.C. 98 on Coley Road (S.R. 1900), just west of the Wake/Durham county line. The clubhouse is about a half mile south on the left along Coley Road.

—Courtesy of the North Carolina Trapper's Association

A Whale of a Hook Up?

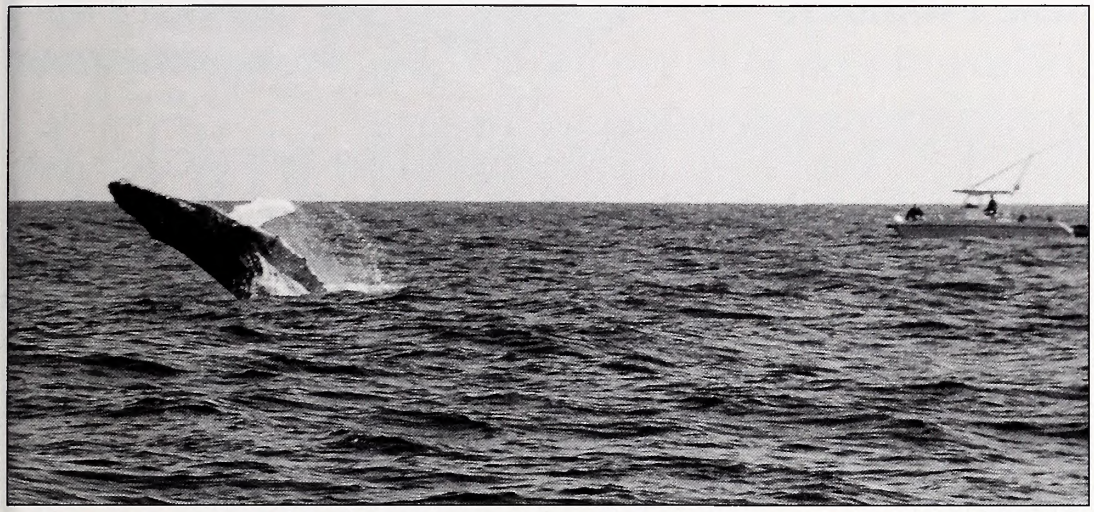


PHOTO COURTESY OF TONY ROSS

Not hardly! These lucky anglers are just watching the spectacular leaps *of a humpback whale as it passes off Cape Lookout in January. Reaching lengths in excess of 50 feet, humpback whales pass through North Carolina's shallow coastal waters as they migrate south for the winter. The whales then make a return visit to North Carolina waters again in the spring as they head north to their summer feeding grounds off Nova Scotia.*

Hurricane Floyd Flood Picture Hits Home

Dear Wildlife:

My husband was on his way back to the office recently after picking up the mail from the post office. While at a stoplight, he flipped through the March edition of *Wildlife in North Carolina*. He said he almost wrecked the car. When he came into the office, he was still in shock. He handed me the magazine turned to page 9. At first, I didn't recognize the building. But at second glance, I could not believe it—the building belonged to us.

The picture was of the Avis Service Center, with our cars parked inside the fence and around the building. We own and operate the Avis franchise in Greenville along with several other locations. We live in Wilmington and stayed there during Hurricane Floyd. After the hurricane, we could not travel to our other North Carolina locations because of the flooded roads in the region. Because we could not determine what was actually going on in Greenville, my husband had to charter a private plane to fly him there. Of course, it was hard to tell the actual water level from the air. Your picture is the only one we have seen of the building during the floods.

We want you to know how much we love the *Wildlife in North Carolina* publication. We found the section on Hurricane Floyd very provoking, and the combination of humor and reality was sincere.

—Robin Y. Dalton, Wilmington

Magazine Correction

Editor's note: In the Back Porch section of the January issue, *Wildlife in North Carolina* incorrectly reported that the Wildlife Commission had acquired six tracts of land. Instead, the Wildlife Commission received funding to pursue acquisition of the following properties: Van Swamp tract, in Beaufort County; Lake Logan, in Haywood County; Buffalo Cove, in Caldwell and Wilkes counties; Cranberry Iron Mine tract, in Avery County; Three Top Mountains Game Land, in Ashe County. *Wildlife in North Carolina* regrets the error.

On Patrol

Editor's note: *While most NorthCarolina sportsmen are law abiding, a few are not. Listed below are reports of wildlife violations that exemplify the sometimes humorous situations our North Carolina wildlife enforcement officers encounter while on patrol.*

◆ Wildlife officers have been able to make a number of turkey-hunting cases recently. From the how-guilty-can-you-get file, Master Officer Frank Couch arrested two people in Moore County for turkey hunting over bait. One hunter was caught sitting next to his automatic feeder, filled with corn. The other had placed his decoy, which was legal, in the middle of a corn pile, which was not.

◆ In Wilkes County, Officer E.R. Williams made a closed-season turkey case when he checked on an area that had been baited in previous years. The officer walked up on a man inside a hunting blind, sporting a 16-gauge shotgun loaded with No. 4 shot (a standard turkey load). The man told the officer that he was not, in fact, turkey hunting. Instead, he was just trying to catch the person who had put out the turkey bait. (Well, you at least have to admire the creative story.)

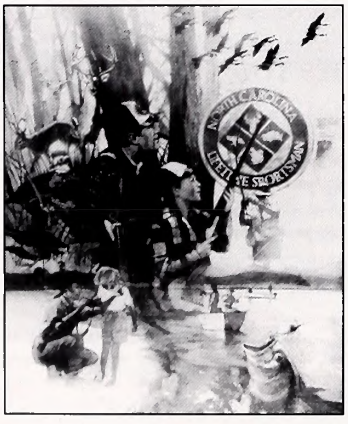
Catch Us at These Numbers

- **1-800-662-7137** to report violations of hunting and fishing laws.
- **1-800-628-3773** (NC VESSEL) for boat registration and titling.
- **1-800-675-0263** for hunting dates and shooting hours for migratory game birds.
- **1-888-248-6834** (2HUNTFISH) to purchase most licenses with VISA or MasterCard using a touch-tone telephone.
- **1-800-446-8663** (I GOT ONE) to report big game harvests.
- Connect to the Commission's online web site at **http://www.state.nc.us/Wildlife/**

The N.C. Wildlife Resources Commission maintains five toll-free telephone numbers to provide better services and convenient access to information for North Carolina citizens. Calls are answered in order, but some numbers may require a wait during busy seasons.

VISA MasterCard

Wildlife Endowment Fund Report



Totals Through February 2000

Principal Balance
$29,738,141.54

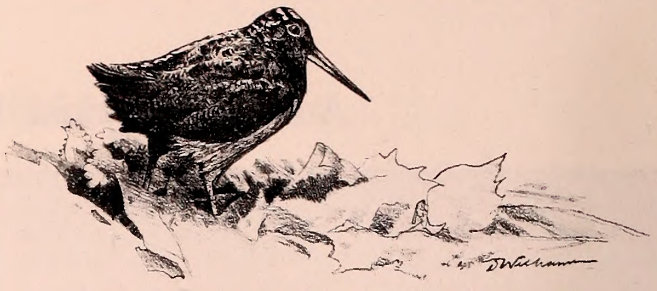
Interest Earned
$30,026,348.93

Total Receipts
$59,764,490.47

Interest Used
$18,580,819.04

Fund Balance
$41,183,671.43

Established on May 29, 1981, this fund is derived from the sale of lifetime hunting and fishing licenses and lifetime subscriptions to *Wildlife in North Carolina* magazine as well as from tax deductible contributions. While the interest may be used to supplement N.C. Wildlife Resources Commission programs, the principal remains invested to generate additional interest for the future.



Managing for Woodcock

by Rodney Foushee

Ah, the secretive timberdoodle. With its long bill, short legs and eyes set so far back on its head that it can see behind itself, the woodcock seems an odd bird, indeed. But looks can be deceiving, for the timberdoodle is ideally suited to live off a rich diet of earthworms skillfully plucked from the moist soil of bottomland thickets.

More than a sporty game bird or a master of camouflage, the woodcock is an indicator of environmental quality—preferring areas with rich soil, thick cover and moist conditions near creeks and springs. Problem is, in our era of land development and forest alteration, quality woodcock habitat is becoming increasingly scarce. Woodcock numbers have consequently plummeted along the Eastern Seaboard to half their levels of just 30 years ago. And the decline continues.

To help reverse the plight of the woodcock, the Georgia Cooperative Extension Service has produced an excellent 16-page booklet, *Woodcock in the Southeast: Natural History and Management for Landowners*. This timely guide provides detailed information about woodcock habits, habitat needs and habitat improvements that landowners can make to increase woodcock numbers on their property. And though it was produced in Georgia, the booklet is aimed at landowners throughout the southern range of woodcock from North Carolina to northern Florida.

Your best bet is to find and protect thick, wet areas on your land where woodcock spend the day. Look for moist soil at the base of slopes or near springs. The best habitat includes rich, moist soil covered by thickets and hardwoods, where woodcock can find worms and avoid predators. You may be surprised to find signs of existing woodcock including their chalky-white droppings on the forest floor.

If you have moist soil but no cover, you can create it by planting alders or cane. If you lack wet woods on your land, you may be able to create them by plugging old ditches. Woodcock also need open areas such as clearings and fields for nighttime activities such as performing their complex courtship rituals.

To obtain a copy of the new woodcock management guide, contact your local Cooperative Extension Service office or check it out on the web at http://www.ces.uga.edu/pubcd/b1183.htm. With good management practices and patience, you may soon witness the spectacular evening sky dance of the male woodcock on your property.

N.C. WILD STORE

RARE HABITATS

water-quality issues

Indian remains

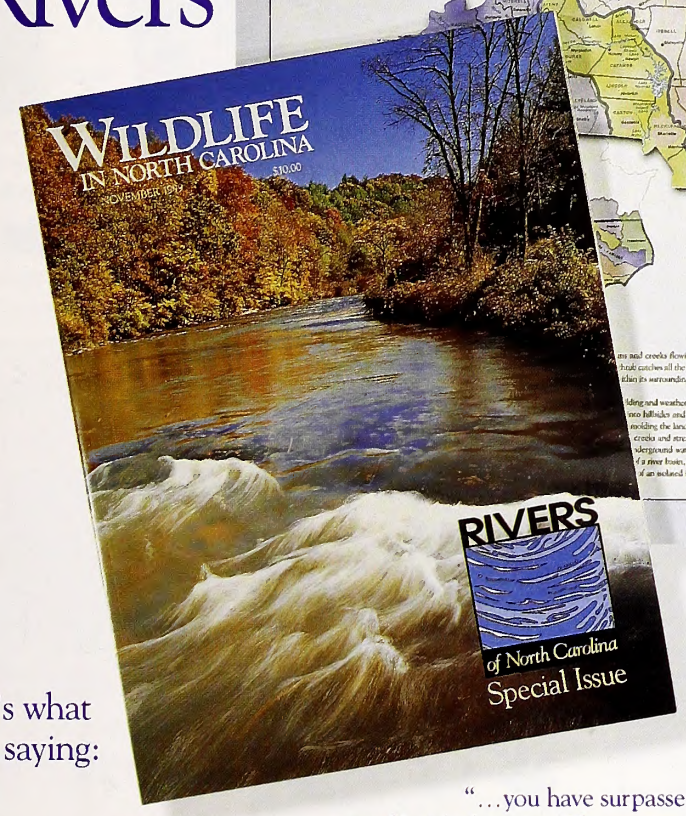
early explorers

the secret life of animals

canoe trips

the real-life stories of people working to clean our rivers

A Time *for* Rivers



Here's what they're saying:

"...you have surpassed yourself with this issue. The art is not just beautiful but illustrative and informative; the photos and charts and sketches of the river basins are put together with a wonderful sense of composition to enhance the articles. ["Rivers of North Carolina"] is a classic."
—Philip Gerard, author of *Cape Fear Rising*

"With excellent writing, photos, and maps, the [special issue] is a beautiful gift to all of us, as well as a wonderful teaching tool for all ages. What a great way to bring in the Year of the Rivers - 2000 celebration!"
—Peg Jones, executive director, North Carolina Watershed Coalition

You'll experience all of these and much more in "The Rivers of North Carolina," a 128-page special issue of *Wildlife in North Carolina*. For timely coverage of all of North Carolina's river basins, as well as eye-catching photos and educational maps and graphics, there's nothing else like it on bookshelves anywhere.

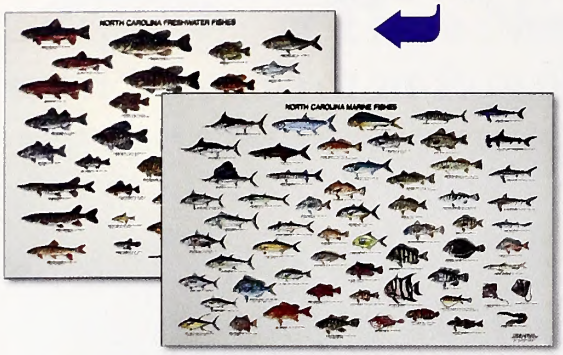
Order "Rivers of North Carolina" today for your own bookshelf, or give it to friends and family members to enjoy. For $10, plus shipping and postage, you'll have a coffee-table edition that's already being hailed as a classic.

Item Code M11 $10

All proceeds from the sale of these products support the development and production of conservation education projects and programs.

N.C. WILD STORE

North Carolina's freshwater fish and marine fish are colorfully displayed on individual posters, and feature the art of Duane Raver. Reel yours in today!



Fishes of North Carolina

Set of 2. Freshwater fish poster shows 36 state species (size 28" x 22 1/2"). Marine fish poster shows 60 species (size 35" x 22 1/2") $10.

ITEM CODE **P9**

Nature's Ways Collection

Explore the wonders of the natural world, wildlife species and ecosystems through "Nature's Ways." More than 200 essays from *Wildlife in North Carolina* have been compiled in a beautiful 6-volume paperback set. $27.50.

ITEM CODE **M9**

Also available as a boxed set. $30.

ITEM CODE **M10**

Before going on your next outdoor hike or camping trip, be sure you know North Carolina's reptiles.

Reptiles of North Carolina

Set of 4 posters in full color. Each poster decribes the species and denotes which reptiles are on the endangered, protected or special concern list. A set includes: lizards, turtles, and both live-bearing snakes and egg-laying snakes. Posters are sized 22" x 34". $18. ITEM CODE **P10**

Amphibians of North Carolina

The Hylid Frogs. North Carolina's tree frogs, cricket frogs and chorus frogs, belonging to the large family *Hylidae*, are presented in this colorful poster, one of two frog posters in the Amphibians series. 22" x 34". $6.

ITEM CODE **P11**

Amphibians of North Carolina

True Frogs and Toads. The second poster in the Amphibians series showcases true frogs and toads. Vibrant photos combine with informative text to make it a standout in the classroom or at home. 22" x 34". $6.

ITEM CODE **P14**

Waterfowl Decoys of N.C.

Nineteen classic waterfowl decoys from North Carolina's legendary days of waterfowl hunting have been collected for the first time on this framable, high-quality poster. This is the first in a series of "Sporting Heritage" posters. 22" x 34". $10.

ITEM CODE **P12**

Traditional Trout Flies of the Southern Appalachians

Sixteen traditional trout flies are presented in stunning color detail. Each fly is accompanied by a brief history of its development and use in Appalachian waters as well as the components that make up each hand-tied creation. Second in a series of "Sporting Heritage" posters. 22" x 34". $10. ITEM CODE **P13**

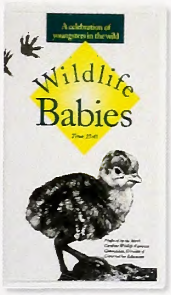
Bird Houses & Feeders: How to Build and Enjoy Them

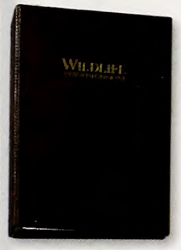
An eight-page illustrated guide to building bird houses and feeders. $2.

ITEM CODE **M6**

Dogs that Point, Fish that Bite

Here are 50 of the best "Our Natural Heritage" columns written by Jim Dean for *Wildlife in North Carolina* over the past 17 years. Published by the University of North Carolina Press and the N.C. Wildlife Resources Commission. 220 pages. Hardbound $19.95. ITEM CODE **M8**
Paperback $10.95. ITEM CODE **M12**





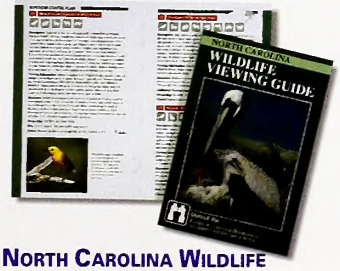
Magazine Binder

Store 12 issues of *Wildlife in North Carolina* in a sturdy binder. $10.
ITEM CODE **M2**

Wildlife Babies Video

Entertaining 25-minute video version of the classic 1965 Jack Dermid film reveals springtime antics of young wood ducks, black bear, possums, cottontails and others . $20.
ITEM CODE **N9**

Based on Chief Seattle's 1855 speech, the film's focus is on environmental ethics. Accompanied by This Land Is Sacred, this film is a must-see for everyone. It is destined to become a classic.



North Carolina Wildlife Viewing Guide

From Cape Hatteras to the Great Smokies, *North Carolina Wildlife Viewing Guide* will lead you to 90 of the state's premier wildlife viewing locations—and better your chances of seeing wildlife once you get there. $5.95. ITEM CODE **N6**

All Things Are Connected

Video and Activity Guide. $22.
ITEM CODE **W3**

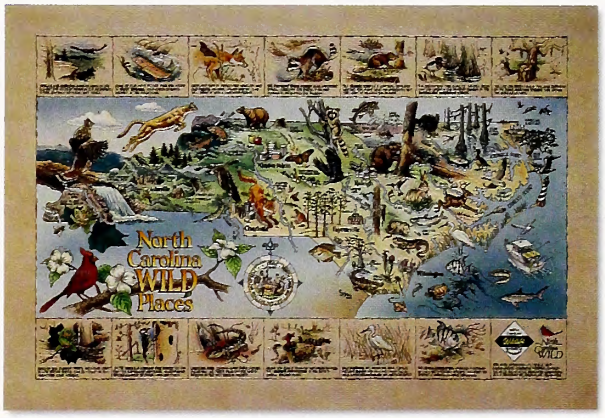
Gardens for Butterflies

Article reprint from *Wildlife in North Carolina* magazine for the gardener who wants to attract some of nature's most colorful creatures. $2. ITEM CODE **M5**

Scouting Correlations

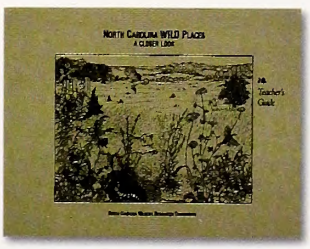
Cub, Boy and Girl Scout requirements are correlated to Project WILD and Aquatic WILD activities. Supplements Scout leaders' planning materials and events. Each $3.
Cub & Boy Scout Correlation. ITEM CODE **E9**
Girl Scout Correlation. ITEM CODE **E10**

North Carolina's wildlife habitats come alive in this 82-page, easy-to-read, soft cover book. With delightful illustrations by Anne Marshall Runyon, N.C. WILD Places covers 13 habitats across the state.



North Carolina WILD Places: A Closer Look

Book and Posters Set. With each book you'll receive two habitat posters (also by Runyon) and a N.C. WILD Places Map poster, featuring the art of Jackie Pittman. $16. ITEM CODE **E6**



North Carolina WILD Places Teacher's Guide

For teachers using *North Carolina WILD Places* in the classroom, these activities and games will heighten student awareness of wildlife habitats. $6.
ITEM CODE **E7**

More terrific items ☛

N.C. WILD STORE

Top-quality, 3-ring binder holds 120 WILDlife Profiles. Custom-made binder comes with a table of contents, tab dividers to organize Profiles by classes, an index and 120 fact sheets.

WILDlife Profiles Binder & WILDlife Profiles Sets 1-12

Binder features clear overlay cover, 1 1/2" capacity and inside literature pockets. See the list of species profiled below. $30. ITEM CODE **W17**

Set 1. Black bear, raccoon, white-tailed deer, striped skunk, bobwhite quail, wild boar, muskrat, mourning dove, coyote, mallard.

Set 2. Mink, canvasback duck, red fox, wild turkey, beaver, American river otter, Canada goose, bobcat, red wolf, cougar.

Set 3. Humpback whale, black duck, osprey, clapper rail, red-shouldered hawk, cottonmouth, diamondback terrapin, largemouth bass, black crappie, channel bass.

Set 4. Brook trout, garden spider, Tar spiny mussel, wood duck, bullfrog, mayfly, tiger salamander, bog turtle, hellbender, shortnose sturgeon.

Set 5. Cottontail rabbit, gray squirrel, northern flying squirrel, newt, common crow, red-tailed hawk, prothonotary warbler, bluegill, striped bass, Eastern oyster.

Set 6. Opossum, peregrine falcon, Eastern bluebird, American toad, rat snake, Eastern glass lizard, smallmouth bass, brown trout, monarch butterfly, Virginia big-eared bat.

Set 7. Chipmunk, gray fox, bald eagle, loggerhead shrike, common snapping turtle, five-lined skink, bluefish, rainbow trout, grasshopper, horseshoe crab.

Set 8. Appalachian cottontail, manatee, barred owl, turkey vulture, Neuse River waterdog, spring peeper, coral snake, American alligator, American eel, American shad.

Set 9. Southern flying squirrel, fox squirrel, great horned owl, snowy egret, Southern leopard frog, corn snake, Atlantic sturgeon, walleye, luna moth, crayfish.

Set 10. Marsh rabbit, woodchuck, hooded warbler, whippoorwill, green salamander, copperhead, fence lizard, muskellunge, chain pickerel, Scotch bonnet.

Set 11. Atlantic croaker, Southern flounder, summer flounder, spot, king mackerel, Spanish mackerel, sea mullet, weakfish, spotted seatrout, striped mullet.

Set 12. Bay scallop, black sea bass, blue crab, brown shrimp, spiny dogfish and smooth dogfish, gag, hard clam, menhaden, sandbar shark, white perch.

Embroidered Caps

North Carolina WILD Cap. N.C. Wild cardinal on brushed-cotton twill cap with a Velcro® closure. Two-tone cap is tan/forest green. $16.50.
ITEM CODE **A1**

Wildlife in North Carolina Caps. Exclusive designs and magazine logo are featured on three different cap styles. $16.50 each.

- Brook trout on sage-colored, brushed cotton cap with an unstructured front, extended bill, and nubuck suede closure. ITEM CODE **A3**
- Deer silhouette on Advantage® Camouflage cotton cap with tan suede bill. ITEM CODE **A6**
- Deer silhouette on blaze orange cap with brown waxcloth bill. ITEM CODE **A7**

Pisgah Center for Wildlife Education T-shirt

100% cotton natural color tee with design on back and Pisgah logo on front. $14.50.
ITEM CODES:
A8MED (medium)
A8LRG (large)
A8XLG (extra large)
A8XXL (extra extra large)

New: WEE TEES

Just like the adult shirt with Pisgah design, only smaller.
ITEM CODES:
A9XS (extra small; size 2-4) $10.
A9SM (small; size 6-8) $12.50.
A9MD (medium; size 10-12) $12.50.
A9LG (large; size 14-16) $12.50.

Wildlife in N.C. T-shirt

WINC magazine logo on front pocket. Tundra swan art on back. White. $14.50. ITEM CODES:
A5MED (medium)
A5LRG (large)
A5XLG (extra large)
A5XXL (extra extra large)

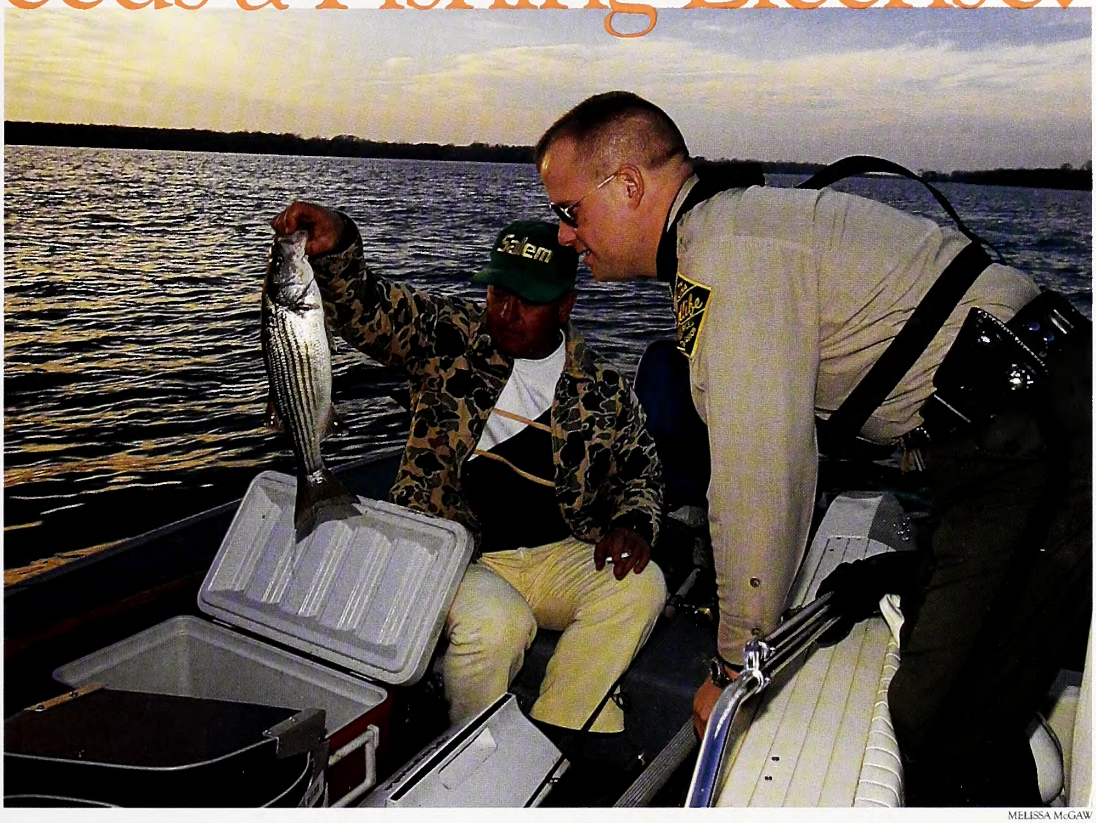
N.C. WILD T-shirt

N.C. WILD logo printed on front and colorful art on back. White. $14.50. ITEM CODES:
A4MED (medium)
A4LRG (large)
A4XLG (extra large)
A4XXL (extra extra large)

WILDLIFE COMMISSION SPOTLIGHT

Who Needs a Fishing License?

Fishing is the most popular outdoor sport in the nation. Every year, thousands of North Carolina anglers flock to the state's waterways to enjoy this recreation. In our state, there are opportunities to fish for everything from native mountain brook trout to migratory striped bass.



MELISSA McGAW

Wildlife enforcement officers patrol the waters of the state to make sure laws designed to conserve our fisheries are followed. Since creel limits and fishing restrictions vary by species and sometimes by body of water, anglers must refer to the *North Carolina Inland Fishing, Hunting & Trapping Regulations Digest* to become familiar with various laws before they begin their fishing trip.

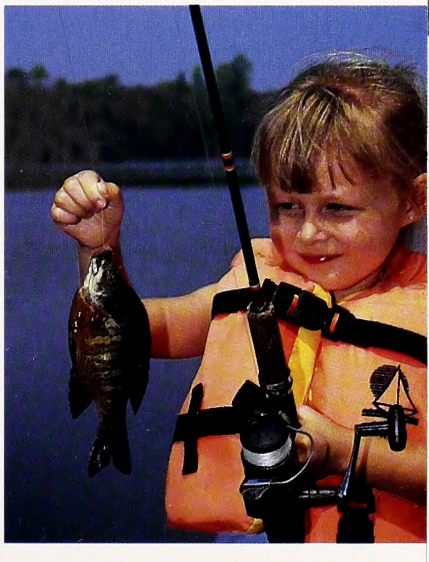
Wildlife enforcement officers on patrol are frequently asked about fishing license requirements. As a general rule, a basic fishing license is required for a person who is 16 years old or older to fish in inland waters. Currently, no saltwater license is required. Money received from the sale of fishing licenses is used for stocking fish, habitat enhancement and for the enforcement of laws that ensure equal fishing opportunity and habitat protection. People who purchase a license enjoy the satisfaction of knowing that they are financially supporting the fisheries resources of the state.

The most common exemptions to the basic fishing license requirement are for anglers who fish in a private pond and for those who fish with natural bait in the county where they reside. Natural bait is defined by law as any bait that may be beneficially digested by the fish. Though anglers fishing under the "Natural Bait" exemption are not required to purchase a basic fishing license, they are required to carry identification that shows their name and current address. This exemption does not apply to the special trout license.

By following these and other game laws you can ensure that any encounter that you may have with a wildlife enforcement officer while you are afield will be a pleasant one.

***Wildlife enforcement** officers patrol the state's waters to make sure laws designed to conserve our fisheries are obeyed so that everyone will have an equal chance at catching fish.*

F. EUGENE HESTER



Tender Mercies

A white ibis gently settles over its brown-splotched eggs, incubating them until they hatch in late May. For more about the state's varied bird eggs, see the photo feature on page 18.

Periodicals postage paid at
Hickory, North Carolina

LITHOGRAPHY BY THE HICKORY PRINTING GROUP,
CONOVER, NORTH CAROLINA

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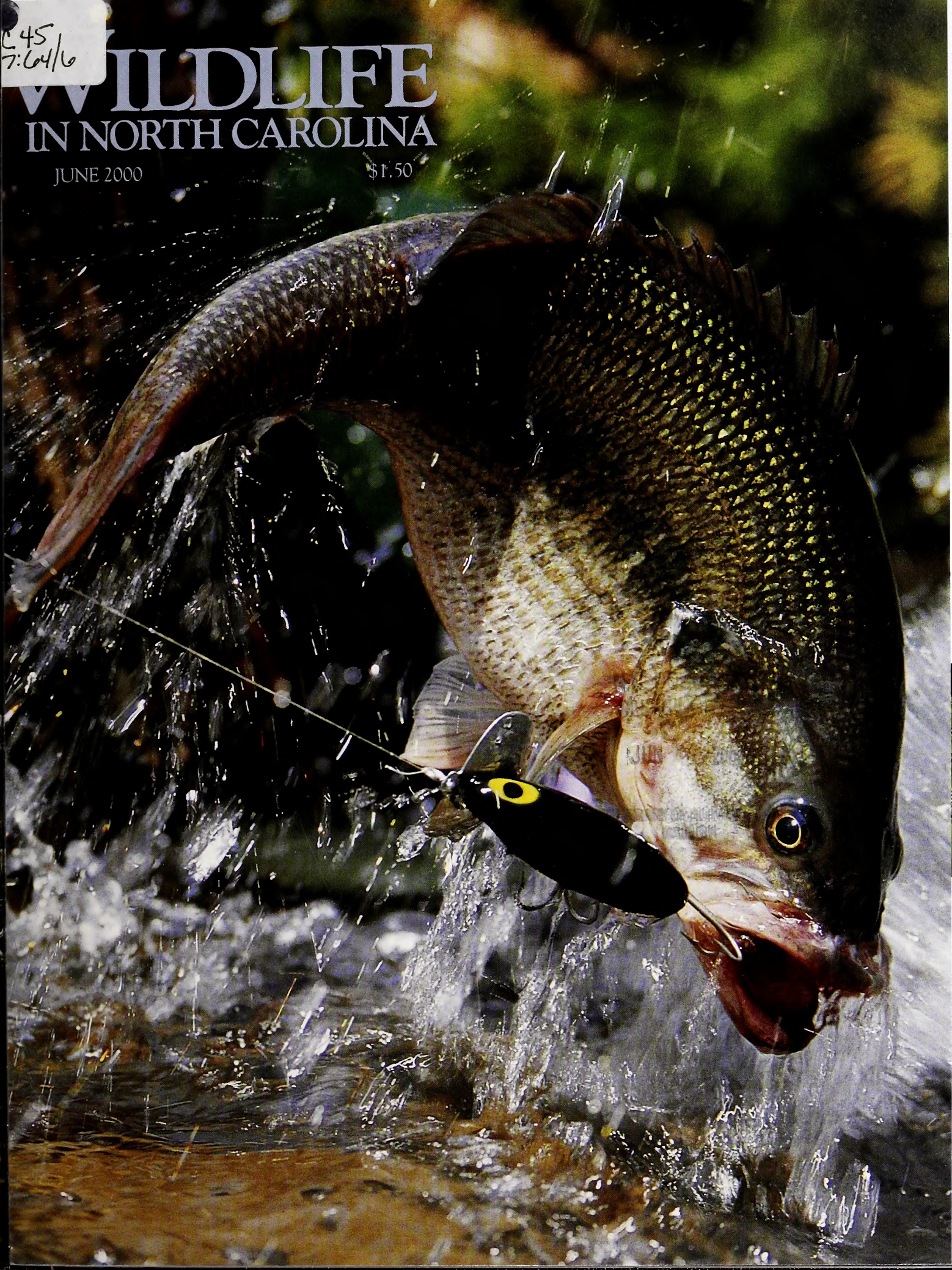
WILDLIFE IN NORTH CAROLINA

JUNE 2000

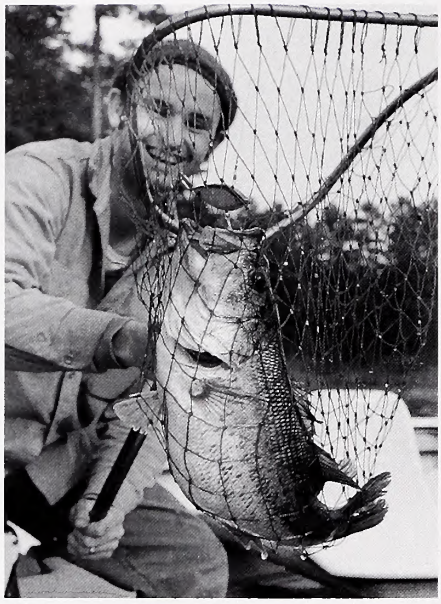
$1.50



When Tradition Is a Trap

by Jim Dean ©2000

I don't recall who made the colorful remark that "Nostalgia is the rust of memory," but it's a mildly insulting reminder that what we choose to remember about the past is often a romanticized and less-than-accurate version of what really happened. I was tempted to toss that quote into a conversation not long ago when I heard a fisherman complaining that bass fishing was much better when he was growing up.



JIM DEAN

"Those were the good ol' days," he said, speaking of the 1950s and '60s when he first began to fish for largemouth bass. "We caught so many big bass back then, and we caught most of them on topwater plugs or shallow-diving lures fishing around the banks. There were hardly ever any other fishermen around, either. I've been a few times this summer and didn't catch hardly anything. I hear about good fish being caught, but I don't believe a lot of it. Everywhere I go the lakes are crowded, and I think a lot of those spots have been fished out."

That sounds like rust to me. True, bass fishing was pretty good 40 years ago and I don't doubt that this fellow caught some nice fish. But his admission that he doesn't catch big bass nowadays also suggests that he still stubbornly fishes the same way he always did regardless of the season. It's just a guess, but chances are he's forgotten that those big catches along shorelines were usually made in the spring. If he's still fishing the same shallow water all day in mid-summer, it's no wonder that he's disappointed with the results. He wouldn't have done any better using those tactics back then, either.

Bass haven't changed their habits during the past four decades, but fishermen have. And fishermen who have kept up with modern developments in boats, tackle and tactics are arguably catching more bass, and more big bass, than ever. The odd thing is that there are still quite a few fishermen—and not just a handful of rusty old-timers—who simply refuse to change their ways.

"Bass haven't changed their habits during the past four decades, but fishermen have."

One torrid day last summer, I was invited to fish with some friends who had bought a new boat and wanted to get in on some of the good bass fishing they'd heard about in Jordan Lake in central North Carolina. Their gear was new and their boat had a modern depthfinder. But we didn't catch anything fishing their favorite shorelines.

"Let's try some deeper spots where the water is cooler," I suggested. "This time of year, bass don't congregate in shallow water; they move out on humps and ridges and off points, and we'll probably find them on such structure where the water is about 10-feet deep, maybe even a little deeper."

"Well, okay," they agreed, "but we've caught bass along these banks on other trips."

"Yeah, but that was earlier in the year when the water was cooler and the bass were in the shallows to spawn," I explained. "They've finished spawning, and moved back offshore."

I knew a couple of places nearby that had pretty good structure, and we used the depthfinder to locate them. We fished with deep-running crankbaits and Carolina-rigged soft plastic worms I'd brought along, and while we didn't bag anything bigger than about 4 pounds, we all caught a few decent bass. It was enough, I thought, to give them a taste of the potential they'd been overlooking.

"Talk to other big-water fishermen and read up on the latest techniques," I encouraged. "Conditions change throughout the year, and what works one trip might not the next."

That evening, as we shook hands at the dock, they said they'd be hitting the stores to stock up on lures for deep-water fishing. I figured they were well on their way to catching some big bass on a regular basis. I figured wrong.

When I ran into one of them last fall, I asked how their luck had been. "To tell the truth, we haven't been fishing," he said. "You know, it's just not much fun to sit out there in the middle of the lake and make cast after cast toward the horizon when it's so hot."

I noted that some friends of mine who fish deep summer structure regularly had been catching gobs of bass, including a fair number of fish in the 8- to 10-pound class.

"Yeah, I know," he said. "But it's just not the way I learned to fish. It's kind of boring, don't you think?"

What I think is that there's a powerful attraction to the rusty nostalgia of casting a topwater plug to a visible target, even when there's no bass bigger than 6 inches within 100 yards.

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Wildlife in North Carolina is the official educational publication of the North Carolina Wildlife Resources Commission. It is dedicated to the sound conservation of North Carolina's wildlife and other interrelated natural resources and also to the environment we share with them.

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Cover *Plenty of big fish lurk in small farm ponds, including lunker bass like this one. Photograph by Soc Clay.* ©2000

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Wildlife in North Carolina (ISSN 0043-549X) is published monthly by the North Carolina Wildlife Resources Commission, 512 N. Salisbury St., Raleigh, N.C. 27604-1188. Periodicals postage paid at Raleigh, N.C. and additional mailing offices. Subscription rates: one year $7.50, three years $20, lifetime $100. All foreign subscriptions are $23.50 per year. For subscriptions from foreign countries, payment **only** by U S Postal Service money order or cashier's check drawn on a U.S. bank. All orders must be prepaid. Please allow 6 to 8 weeks delivery on new subscriptions and address changes. **POSTMASTER:** Send address changes to Circulation Manager, 1711 Mail Service Center, Raleigh, N.C. 27699-1711. Address all correspondence regarding subscriptions to Circulation Manager. If you have a problem with your subscription, dial (919) 662-4377. Articles in *Wildlife in North Carolina* may represent the personal views of authors, and do not imply endorsement by the North Carolina Wildlife Resources Commission. *Wildlife in North Carolina* is available on audio cassette as a courtesy of volunteer services of the Department of Cultural Resources, Library for the Blind and Physically Handicapped, Raleigh, N.C., (919) 733-4376. **The N.C. Wildlife Resources Commission is an equal opportunity agency.**

The Bare Bones of Skeletons

written by Roger Powell ©2000
illustrated by David Williams

Can a lady be a knight in shining armor? Yes, if the lady in question is a ladybug. The ladybug's armor is her *exoskeleton,* the rigid skeleton she wears on the outside of her body. Ladybugs are insects and all insects have exoskeletons, as do crustaceans (crawdads, shrimps), spiders and all other arthropods, which are segmented animals with jointed legs. Because arthropods are the most common animals in the world, most animals have exoskeletons. People don't have exoskeletons, however. Skeletons inside bodies, like ours, are called *endoskeletons* and are less common.

Exoskeletons have a lot of advantages. A ladybug is hard to kill and hard to eat because of her exoskeleton. Like other beetles, she has hard front wings, called elytra, that fold over and protect her soft hind wings. A ladybug's bright red, spotted armor is actually her elytra. Beetles are not graceful flyers because they must hold their stiff elytra out of the way while flying only with their hind wings. Yet the additional protection that beetles gain from wing armor has helped them become the most numerous of all insects, despite their clumsy flight.

An exoskeleton is also stronger than an endoskeleton. An insect that collides with a lantern at night suffers no injuries. It simply rights itself, folds its hind wings under its elytra and then goes about its business. And exoskeletons, which are like stiff raincoats, keep rain water out and body water in. A ladybug's exoskeleton keeps her body water from evaporating and drying her out. Its hard surfaces provide many well-protected sites for organs of smell, so arthropods can smell with their legs, from their sides or from other places.

Of course, there are some disadvantages to having an exoskeleton. Because an exoskeleton is rigid, animals with exoskeletons can grow only by shedding an old one and growing a newer, larger one. The new exoskeleton develops under the old one, so that when the old one is shed the new one is exposed. The new one is soft, however, and it must expand before it hardens. While its new exoskeleton is in the softened state, the animal is easy prey for predators. It also evaporates body water more easily, and has to support itself with soft tissues. If you had an exoskeleton, you wouldn't be able to keep your shape after a molt, nor would you be able to hold your legs stiff or your head up.

Indeed, only small animals can have exoskeletons. The largest animals with exoskeletons are aquatic crustaceans, which are supported by the surrounding water during molt.

Because exoskeletons are like raincoats that do not breathe, animals with exoskeletons cannot cool themselves by sweating. The real knights in shining armor in the Middle Ages wore about 70 pounds of armor and they overheated in hot weather. And while an exoskeleton may be inherently stronger than an endoskeleton, its joints are not. The exoskeleton around an insect's leg is like sections of stove-pipe, with one section of stove pipe for each leg segment. Where two sections of stove-pipe meet, the insect must have a flexible leg joint. Insects solve this problem by joining the sections of exoskeleton pipe at just one or two points that project from the ends of the stove-pipe sections. All weight must be supported at the points of contact. You and I need sturdier joints for support.

Big animals like us need endoskeletons; our joints can support heavy weights. An endoskeleton also allows big animals to cool themselves by sweating, while large size provides the space needed for complex organs of sight and hearing. Very large animals are safe from most predators simply because they are big. And large size allows mammals and birds to stay warm with heat produced by their own bodies. Mammals and birds can, therefore, be active during cold winters when insects must be dormant.

Nonetheless, being small has allowed arthropods to adapt to living spaces too small for animals with endoskeletons. And small size means that food requirements are small.

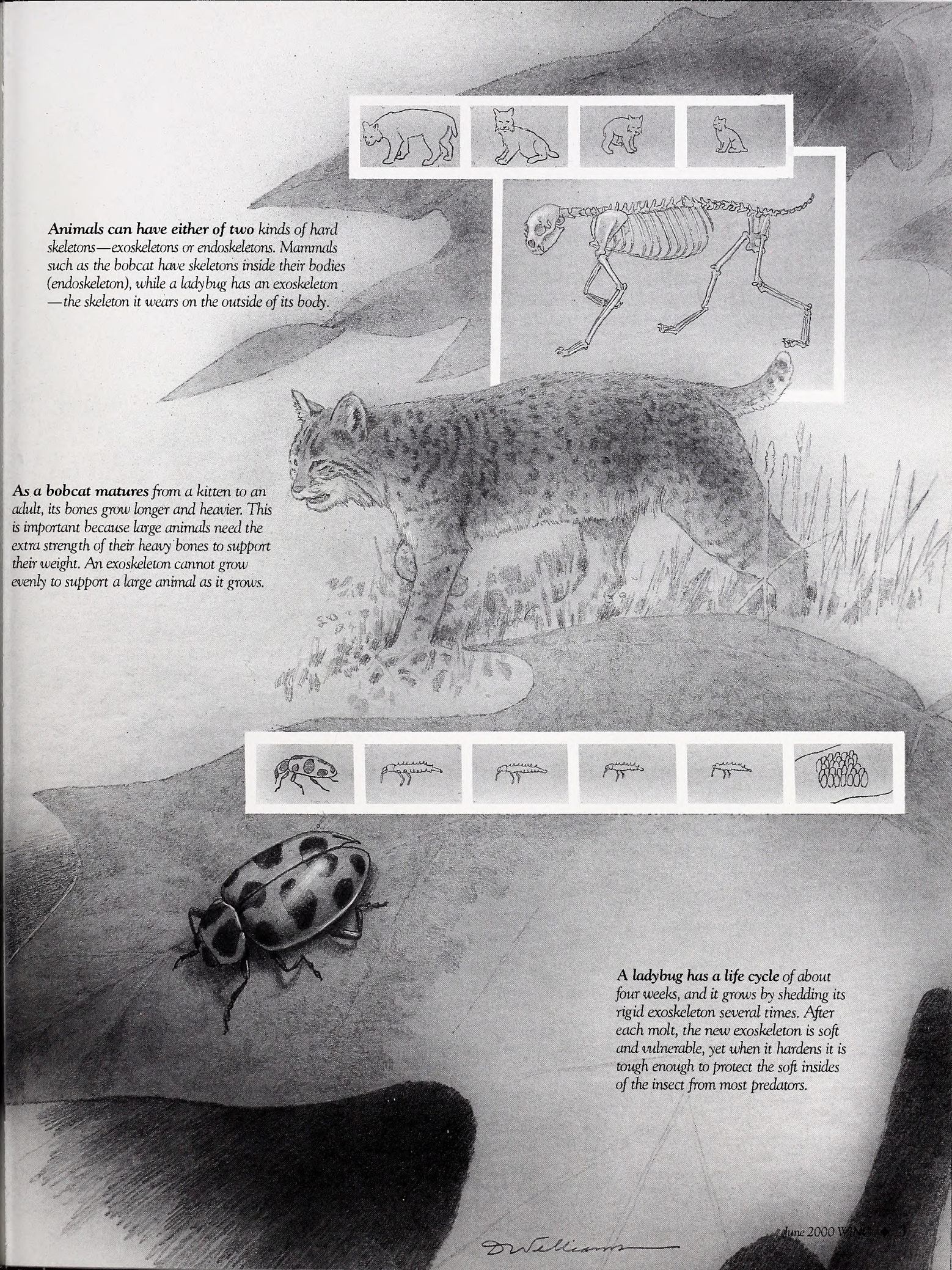
Insects have become dizzyingly diverse since their appearance over 360 million years ago. When you behold the numbers and kinds of insects this spring—ladybugs, flies, mosquitoes, June bugs, leaf hoppers, moths, butterflies and cicadas—remember that it's their exoskeletons that have given them an edge, an edge that they have exploited nearly everywhere on earth.

Other Reading:

- Borror, D. J. et al. *An Introduction to the Study of Insects,* 6th edition (Philadelphia, 1989).

Surfing the Web

- Check out the Animal Diversity Web site at the University of Michigan. *Address:* http://animaldiversity.ummz.umich.edu/index.html
- The Tree of Life site contains information about the diversity of organisms on earth, their history and characteristics. *Address:* http://phylogeny.arizona.edu/tree/phylogeny.html
- Look at the Insects on the Web site for "Bug Bios." *Address:* http://insects.org/
- A short exploration of "The Exoskeleton: A Bug's Suit of Armor." *Address:* http://www.letsfindout.com/subjects/bug/rfiexosk.html



Animals can have either of two *kinds of hard skeletons—exoskeletons or endoskeletons. Mammals such as the bobcat have skeletons inside their bodies (endoskeleton), while a ladybug has an exoskeleton —the skeleton it wears on the outside of its body.*

As a bobcat matures *from a kitten to an adult, its bones grow longer and heavier. This is important because large animals need the extra strength of their heavy bones to support their weight. An exoskeleton cannot grow evenly to support a large animal as it grows.*

A ladybug has a life cycle *of about four weeks, and it grows by shedding its rigid exoskeleton several times. After each molt, the new exoskeleton is soft and vulnerable, yet when it hardens it is tough enough to protect the soft insides of the insect from most predators.*

fishing small waters

FORGET EVERYTHING YOU'VE HEARD—BIGGER ISN'T ALWAYS better! At least when it comes to quality fishing holes. Sure, huge lakes and reservoirs provide thousands of acres of water to choose from. But these spacious waterways come at a price—including the need for expensive boats and equipment to probe their depths—not to mention keen competition from other anglers.

Nearly forgotten are the thousands of ponds and small lakes that dot the North Carolina landscape. And what these tiny jewels lack in size, they more than make up for in character and solitude. Whether it's an eastern millpond or a foothills farm pond, chances are good you can have the place to yourself. Fish them by float tube, small boat or simply by foot—small waters are bound to please. And can they ever deliver—the state record largemouth bass—a 15-pound, 14-ounce behemoth—was pulled from a 3-acre Union County farm pond. Here's hoping you find the time to sample some of these small waters.

F. EUGENE HESTER

fishing small waters

farm pond basics

written by David Hart ©2000

Want an honest shot at a lunker largemouth? Forget huge lakes and reservoirs and give a local farm pond a try.

"FOUR BASS OVER 8 POUNDS." Those five words nearly brought me to my knees. I was shocked, awestruck and thrilled all at the same time. My friend had done what I have yet to do in 30 years of fishing. And he did it four times in one day.

Eight-pound bass don't come along very often, at least for average folks like you and me, but the guy who called me on a pleasant Saturday evening in April wasn't an average angler. He was my friend, Steve, who has access to dozens of the best private fishing holes in the state.

All of those huge bass came from one tiny, speck-on-the-map farm pond in the rolling foothills of the Blue Ridge. My friend wasn't in a boat and he doesn't own a rod-and-reel outfit that costs more than $50. And between you and me, Steve doesn't know the difference between a Texas rig and a Carolina rig.

He is, however, a fairly skilled angler and happens to possess a quite unique fishing skill: the gift of gab. My frequent fishing partner can talk his way through just about any farmer's gate and gain permission to the best fishing holes in the state. Mention a landowner rumored to shoot rock salt at anybody he catches fishing in his pond, and my friend will knock on his door. And more than likely, after a brief conversation with the fellow, he'll have yet another fish-filled farm pond under his belt.

Truth is, the farm ponds that dot the North Carolina landscape offer the best odds for tangling with a bigger-than-average largemouth or sunfish. If you want an honest shot at an 8-pound-or-better bass, forget those huge lakes and go fish a pond.

Finding These Little Treasures

It never hurts to scan distant fields and woods as you drive narrow country lanes, but not all ponds are built within sight of hard-top roads. In fact, the most visible ponds are the ones that are fished the hardest. Or at least they are the ones that most anglers try to get permission to fish. It never hurts to ask about those easy-to-see ponds, but to increase your odds, it's wise to seek other waters.

That's why it's a good idea to study topographic maps and hunt down the ponds that are tucked beneath hills or hidden behind a wall of trees. After you pinpoint those out-of-the way blue circles on the map, it's time to knock on some doors and ask the landowners for access.

The Perfect Rod and the Tackle Box

Anglers who are used to fishing from 20-foot, mega-motored bass boats might get confused at the thought of standing on the bank to fish a two-acre body of water. The tons of tackle and dozens of rod-and-reel combinations that litter most bass boats just won't cut it in this situation. In fact, many veteran pond fishermen have honed their tackle down to one small box and pole.

I used to try to lug a fully stocked tackle box and an extra rod around the ponds I fish, but that was simply too much work. Imagine working your way down the shore, then backtracking to retrieve the gear you left behind. Now picture yourself trying to snake your way through the thick brush that often grows along pond edges with an extra fishing pole or two in one hand and a 20-pound tackle box in the other. After a few seasons of fighting that system, I whittled my selection down to one rod and a small selection of tackle that could easily fit into a daypack.

My favorite pond rod is a medium-action spinning rod loaded with 8-pound monofilament. It's heavy enough to win most battles with bruiser largemouth bass, yet light enough that I can cast a tiny crappie jig for panfish and still enjoy the strong pull of a bull bluegill. Sure, any seasoned angler will tell you there is no rod that will do it all, but find

***Dotting the North Carolina** landscape, farm ponds provide a very accessible opportunity for many anglers to get a chance at huge largemouth bass. This 8-pound largemouth was taken from a Piedmont farm pond.*

the one that serves you best and travel light. You'll be glad you did.

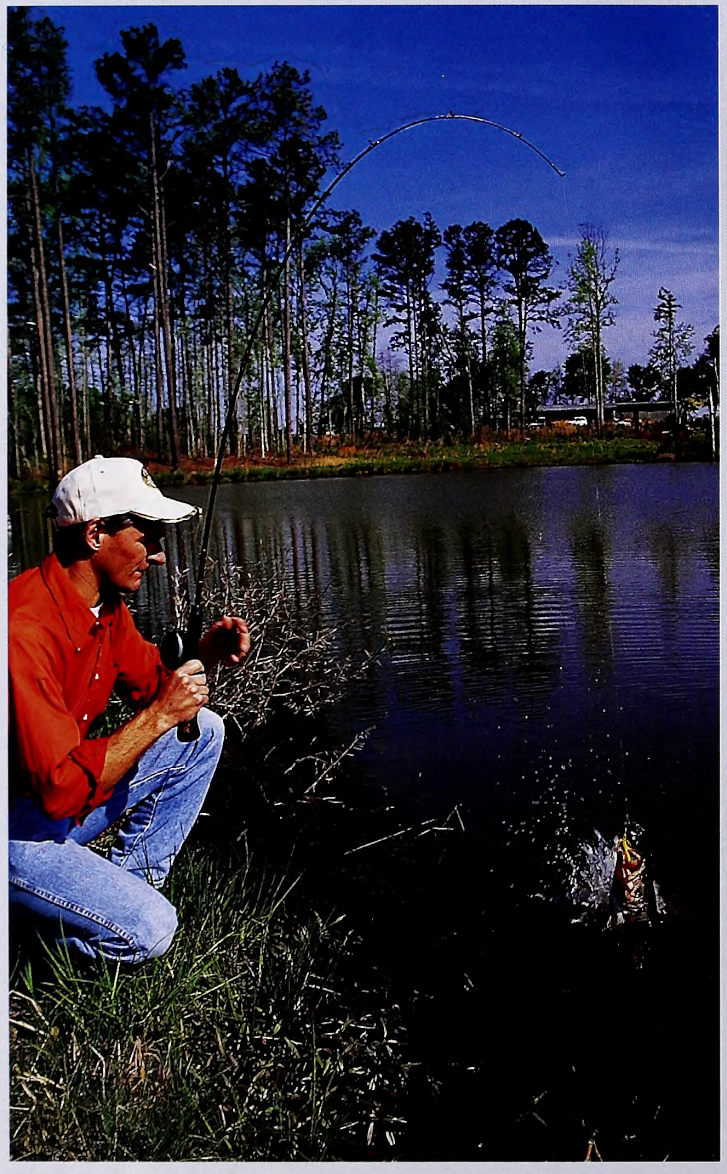
My tackle box consists of a selection of bass lures that covers a variety of depths and speeds, and a handful of jigs intended to fool crappie and bluegill.

Six-inch blue, red shad and pumpkin/chartreuse plastic worms make up the bulk of my slow-moving, bottom-hugging bass baits. Spinnerbaits, a few crankbaits and a handful of white, chartreuse and pumpkinseed grubs round out my mid-level lures. And a bag or two of soft plastic jerkbaits, along with a buzzbait or two and a few slower topwaters, finishes out my selection of bass tackle. Of course, a few extra hooks and bullet weights are necessary, and a couple of small bobbers are a good idea if you want to fish for panfish.

Put on a hat, lace up your boots, lather up with some sunscreen, throw a small bottle of water or soda in your pack, and you're set. If you plan on keeping any fish, a 5-gallon bucket will do nicely if you aren't going to move too far from your car. Also, I always carry a camera in my daypack to record those big fish that I throw back.

***Forget the mega-motored bass boat** and the armfuls of equipment, farm pond fishing can be delightfully simple. A single rod and a few basic lures are all you need to be successful on most farm ponds.*

F. EUGENE HESTER



The Best Ways to Fish Ponds

The best advice I have is drive up to the water's edge, step out and start chucking a lure. Hey, we're not fishing the Florida flats here. When it comes down to it, there isn't much mystery to farm ponds. Most every magazine article we read and fishing show we watch tells us to belly-crawl up to the water, study it for 10 minutes and then work it systematically. But, I say just start fishing. This is supposed to be a relaxing way to spend a Saturday, not a full frontal assault on Normandy.

Yes, I probably scare a few fish away from the bank each time I walk up and start casting, but the beauty of most ponds is that they are filled with fish. If you chase a bass away from the water's edge in one place, it's a good bet there is another one lurking a few yards down the shore. Of course, it is a good idea to study the water and determine what type of cover is most likely to hold fish and then approach it accordingly.

I usually take a water temperature reading before I choose my first lure of the day. Ponds typically heat up faster than larger lakes, and bass behave differently in varying bodies of water. Nothing determines what types of lures work best like the water temperature.

When it comes down to it, fishing a 2-acre farm pond from the bank is no different than fishing Kerr Reservoir from a boat. Practiced anglers can spot the best areas in a heartbeat and work them thoroughly with the best lures. Look for fallen trees lying in the water, shoreline vegetation, points and other obvious fish-holding cover, but don't neglect the rest of the water. Hidden stumps, rocks and other places might be out of sight, but not out of casting distance.

In other words, fish each pond thoroughly and if you're targeting bass or panfish, keep moving.

Keeping Your Foot in the Door

The number one reason landowners lock their gates to everyone but a few of their neighbors and friends is litter. Empty bait containers, soft drinks and beer cans get carried to the pond banks and are somehow left behind. Also, gates that were closed and latched mysteriously swing open and let cows into places they shouldn't be. Nobody supposedly does it, yet it still happens all the time. Just ask any landowner.

The most challenging aspect of fishing farm ponds is gaining the landowner's permission (see "Getting a Foot in the Door," page 11). Like fishing, it takes locating the ideal spot, choosing the best initial presentation and follow-through. Once you've landed access to a honey hole, then you can concentrate on those bucket-mouthed bruisers.

But remember: no belly crawling. ⊠

jump into fly-fishing

written by Keith Berend ©2000
photographed by Melissa McGaw

Literally! Grab a fly rod and set your float tube adrift in a farm pond for some exciting bass action.

WITH THE SUN SETTING, A PAIR OF WOOD DUCKS CUP-IN to the far side of my own little oasis. The resident Canada geese honk and flare as I make eye contact with them on their search for an evening watering hole. I cast repeatedly toward a small blow-down in the corner of a generous local farmer's pond and strip the Dahlberg Diver back to my belly-boat. A swirl, then a splash, as a hungry farm-pond bass inhales the white rabbit strip fly. He jumps and swims full circle around my little inflatable ship. I lip the fish, which measures a hearty 18 inches, thank him for his time, and release him back to the keeping of the friendly cattleman.

Leaving work at 5 p.m. on a sunny spring day, the last thing on most commuters' minds is tight lines and jumping bass. Our lives have turned into fast-food dinners, six-day workweeks and get-away vacations that take months to plan and schedule. The Dow crests at more than 11,000 and we E-mail friends and family instead of using pen and paper. It's a new age. Flyfishermen have gear on top of gear: boats in the garage, expensive fly-fishing equipment, mounds of fly-tying accessories.

But the one thing that we are all short of is free time. We'd all love to watch a rising mountain trout sip a No. 16 dry fly, but how often do we get to Linville Gorge or the Davidson River? Perhaps a 1-pound largemouth bass is no match for a screaming 12-pound false albacore, but when do we have time to make it to Harkers Island?

Instead, there is an answer for the mid-state angler. When warm weather arrives, jump into fly-fishing. And I mean that literally—jump into a float tube in a local pond and fish! The requirements are simple and inexpensive. Bass fly-fishing is not just for the die-hard long-rodder; it is a great way to *start* fly-fishing. Without the worries of long, delicate casts and mended line, beginning fly-fishing can be a blast.

The Requirements

To get started you will need waders (even the cheap rubber ones) and a float tube. As for tackle, I suggest a 6- to 8-weight rod that is comfortable enough to throw hundreds of casts in an evening. The flies are also simple. A complete farm-pond bass fishing fly-box needs to include only four flies: woolly buggers, Clouser minnows, Dahlberg divers and, of course, deer hair poppers. One or two of each is usually sufficient. I use a 6-pound tippet and a standard leader. There are no long delicate presentations and no need to worry about your drift or mending the line. Just cast and retrieve.

Jump In

The initial and probably most important step is to find ponds (See "Getting a Foot in the Door," page 11). Once you've done that, the fun can begin.

Keep your gear in the car. When the weather is right, the lawn is not yet knee high and the 5 p.m. whistle blows, give the farmer a quick call and head out. Cast several times into "the boat ramp" where you are going to put in and set the SS Float Tube a-sail. You would have spooked many a fish if you had waded into the pond. Once afloat, cast to the left and right, then set up a comfortable casting distance from shore. Remember, bass are the aggressive predators of the pond and a splashy presentation only serves to stimulate the strike.

fishing small waters

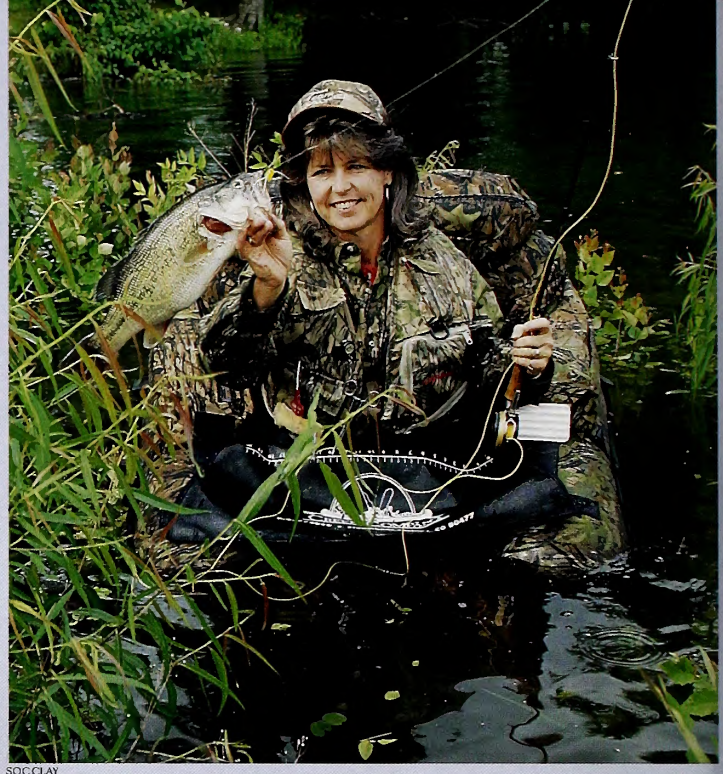
Use short leaders and tippets. I normally start the expedition with a Dahlberg diver; this gets down slightly and when the sun is still high, the fish may not yet be hitting the top water. Get the fly as close to the shore and to cover as you dare.

I employ a technique my fishing buddy calls "power fishing." Make two or three casts to each spot along the shoreline, then kick or walk a few feet down the shore and cast again. I don't spend much time in one place. This way I cover more water and usually get around the entire pond before night falls. Others prefer to choose likely spots and hit them hard with several casts, patterns and colors. With divers, woolly buggers and Clousers, cast and start the retrieve quickly. An erratic swimming motion produces the most strikes.

With poppers, cast and let them sit a short time before beginning the retrieve. Then pop it and pop it loudly. Splash the fly and create a commotion on its journey back to the next cast. When a fish strikes, hit it hard. Set the hook as if this were the biggest tarpon. Seldom will I get the fish onto the reel; instead, hand retrieve the line. Let the largemouth tire before you land it, quickly and gently remove the hook and quietly return the fish to the water. If you miss a strike, stop the retrieve and start up again more slowly. Make several casts toward a missed fish or a swirl. Vary the retrieve. Every 10 or 15 casts, turn around and cast out toward the middle of the pond. Cast toward every piece of structure big or small. Sneak a cast into each nook and cranny.

The Results

Per surface area, I am convinced that farm ponds hold more big hungry fish than any of the local reservoirs. And they are more convenient and easier to fish on short notice. I know of multiple 10-pound-plus fish caught on the fly in tiny ponds hidden on the backs of old tobacco farms. Floating in the still evening water with a majestic white-tailed deer wandering the tree lines makes even a small fish seem huge. While the ducks fly overhead, and dove and owl calls ring in the night like dinner bells at a dude ranch, a huge fish will emboss a memory that will last a lifetime. In our busy world, farm ponds can provide the needed respite to keep us sane between trips to the trout stream or the Gulf Stream. Lastly, you will find that suddenly you have found a new friend in the landowner when he or she invites you in for sweet tea after a fishing trip. Memories and friendships like these are the building blocks on which the day-to-day problems can be vaulted effortlessly.



SOC CLAY

***Landing a nice bass is just an** added bonus to the serenity found when fly-fishing small water from a float tube.*

Tips of the Trade

1 Tie your own creations and creatures to fish the ponds. This more than doubles the reward. To triple the fun, build and wrap your own bass pond rod. This can make your precious little time even more your own.

2 Bring water or juice. Never drink alcohol while fishing on someone else's property. Don't ever litter, and pick up and dispose of any trash you might find.

3 Bring a disposable camera—you never know when you might catch a trophy.

4 If you are a hunter or have recently fished a distant destination, bring fresh fish or game to the landowner as a gesture of thanks. Unless directed to do so, do not keep any fish from the pond. ⊠

Keith Berend is a physician who wrote this article while completing his residency at Duke University Medical Center in Durham.

flies

FLIES COURTESY OF JOHN MARTYN

Getting a Foot in the Door

Gaining access to private ponds is probably the most difficult aspect of farm pond fishing. Here are some tips for getting your foot in the door.

YOU CAN FIND FARM PONDS BY TALKING TO CO-WORKERS, clients or, in my case, patients. Another technique is to drive around the countryside on a nice spring Saturday or Sunday. I suggest stopping and asking the landowner of any pond that looks like it would be fun to fish. Smile and introduce yourself. Explain who you are and what you do for a living. Explain your love for fishing, your commitment to conservation, and your chronic shortage of time.

I usually add that I only fly-fish and that catch-and-release is my strictest rule. (Occasionally, a pond owner may want you to harvest some fish to keep the pond in balance.) Ask if he or she ever allows people to fish in that beautiful pond; then ask if you can fish there too. I strongly recommend that you add that you are just out for a drive or on an errand and don't want to fish today but that you would love to call sometime to try the water. Leave your card. Take down the landowner's name and number, and always add a note about the location and any restrictions that the landowner relays to you. Always call before you drop by to fish. Even if they tell you to come by anytime, call first. Also, stop by after you fish to offer your thanks and appreciation and, of course, give a fishing report. Do this religiously. One more tip: never bring a guest unless cleared to do so by the landowner.

I'd love to say this technique is as reliable as the fishing, but like in the majors, batting .300 ain't bad.

—Keith Berend

WITHOUT A DOUBT, THE MOST DIFFICULT ASPECT OF fishing farm ponds is simply getting a "yes" out of the owner. Anxious anglers constantly badger farmers, particularly those near larger cities, in the spring. Landowners can see them coming a mile away. In most cases, it's easier and safer for a pond owner to simply say "no" to every stranger who asks. There are ways to get permission, however. The best way is to simply knock on doors at the right time of the year and say the right things.

"If you don't have permission on a few ponds in the spring, don't try to get it. Wait a few months," says my friend, Steve. "In the spring, farmers are busy planting and they've probably gotten tired of people asking to fish their ponds. When they see a smiling city slicker step out of a fancy sport utility vehicle, they know what's coming. The same goes for hunting season."

The best time to roam the countryside in search of new fishing holes is well before the trees start to show any spring color. That's when farmers are working on equipment in their barns or tending to their cattle and are less likely to be atop a tractor for 14 hours a day. The second best time, Steve thinks, is during the heat of the summer. Crops are planted, farmers seem to be a little more relaxed and the frantic rush of thousands of anglers looking for new water to fish has subsided.

"Go by yourself or with no more than one other person," my pond-fishing friend said. "Think how you would react if a carload of guys showed up at your farm and asked you to fish. I like to take one person, just because he can help lighten the mood when we talk to the landowners. Sometimes, I get a little nervous when I go by myself."

Present yourself as a responsible, ethical angler, and above all don't try to hustle your way onto the pond. Farmers have seen all sorts of swindlers, and you won't do yourself any favors by trying to finagle your way in.

"Above all, just be yourself, ask nicely, tell him that you'll close the gates, pick up your trash and respect his property. I'll usually tell him that I don't want to keep any fish, unless he wants me to clean out some bream or crappie," my friend added. "The worst he could do is say 'no'."

And if the landowner gives you permission, follow up on your promises. Don't leave any trash behind (even if it's not yours), throw back that 10-pound bass, leave gates the way you found them, and stop by the barn or farmhouse on your way out to tell him or her what you caught and to say, "Thank you."

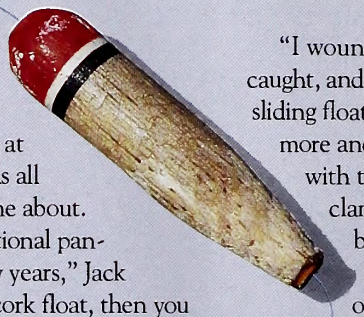
You might be surprised when the owner says, "Come on back anytime now." If not, ask nicely if you can come back and fish again. That might be all it takes to have a lifetime of access to the best fishing holes in the state.

—David Hart

JACK and his sliding cork

written and photographed by Jim Dean ©2000

Want to catch whopper bluegills and shellcrackers? This is absolutely the deadliest tactic you'll ever use.



JACK AVENT ISN'T QUITE SURE WHEN HE first discovered his highly versatile and effective tactic for catching huge bluegills and shellcrackers. A good guess would be at least 30 years ago, maybe longer. But he says it was all an accident, and he clearly remembers how it came about.

"I was fishing with live crickets using the traditional pan-fishing rig just about everybody has used for many years," Jack recalls. "The line is thread through the hole in a cork float, then you tie on a small hook and pinch one or two split shot on the line above the hook for weight." A wooden peg clamps the line in the hole just tight enough so the angler can still slide the float up or down to establish the depth he wants to fish. Nowadays, many floats are plastic and have a spring-loaded wire clamp to hold the line, but it's the same idea. It's a standard rig used by cane pole fishermen, except Jack was using spinning tackle.

"It's awkward to cast, but I was catching a few small bluegills," Jack says. "Then, I guess the peg must have come out of the float when I made a cast. Without the peg, the float was sliding freely up and down the line. I figured that made it useless and I don't know why I didn't put a new peg in the float right then. But I made another cast. I'm sure glad I did."

The line running freely through the float allowed the weight of the split shot to carry his cricket to the bottom. He was just about to reel it in and replace the peg when the float skidded sideways suspiciously and he instinctively set the hook. This wasn't one of those little bait-stealing pip-squeaks he'd been catching. It was a thick, slab-sided bluegill that weighed nearly a pound.

Curious to see if it was purely accidental, Jack decided to rebait and try again. Another whopper bluegill gulped his cricket off the bottom. And another.

"I wound up with a cooler full of the biggest bluegills I'd ever caught, and I began to experiment seriously with the idea of a free-sliding float," Jack says. "I soon realized that I was not only catching more and bigger fish, it was far easier to make long, accurate casts with the free-sliding float rig. And even though the float is not clamped to the line, it still yields enough motion when a fish bites for the angler to detect it. But most important, I could fish on the bottom at any depth from very shallow to 15 or 20 feet or more."

Jack had learned a secret that surprisingly few panfishermen seem to know—that fishing with your bait on, or very near, the bottom is the key to catching big bluegills and redear sunfish (shellcrackers) too. These fish may be in a foot of water or in a dozen feet of water, but when they're looking for a snack, they usually look down. That's because the natural foods bluegills and shellcrackers prefer—various nymphs, tiny crustaceans, small minnows—almost all live on or near the bottom or around vegetation growing there. Indeed, redear sunfish are even more likely than bluegills to key in on bottom-dwelling prey, especially snails and small crustaceans. The name shellcracker derives from the patch of grinding molars in the species' throats, which they use to crush their food, including freshwater snails and mussels.

Sure, shellcrackers and bluegills sometimes love a floating popping bug, especially in the spring when these fish spawn in relatively shallow water. And it's true that both species are often caught suspended in mid-depths close to a structure such as a brush pile, stump or drainpipe. Yet, when bluegills and shellcrackers are clustered in open water mid-depths, they are not usually interested in feeding.

So why do we so often insist on dangling bait in the mid-depths below a cork when that's not the prime place to catch fish? Is it tired tradition? Old habit? Do those fixed floats make it harder to fish on the bottom? Probably, it's a little of all of these.

In fact, skilled bluegill and shellcracker bait fishermen have long known that they should fish on or close to the bottom, and they try to adjust their floats to put the bait there. Unfortunately, that's not always easy to do because the depth of the water is likely to be different on every cast unless you're anchored and casting repeatedly to the same spot. Also, with a cane pole or fiberglass Bream Buster, it is impossible to fish bait under a fixed float at depths much beyond 6 to 10 feet deep, even with long poles. And even with spinning tackle, it's difficult to cast a fixed-float rig because so much line is hanging out beyond the tip.

Shortly after spinning became popular decades ago, fishermen recognized that a free-running float that could slide down the line to the split shot made it easier to cast. The rig that became popular employs a movable "stop" on the line—a knot of string or rubber band—that stops the float at some predetermined depth. It solves the casting problem, and it's particularly useful when fishing for crappies or other fish that suspend. Indeed, you can set the stop knot and be sure on every cast that you're fishing just the right depth for a school of crappies. But this rig isn't designed to automatically put your bait on the bottom the way Jack's rig does, so it's not as effective for bluegills and shellcrackers.

Being able to make long, accurate casts and still fish on the bottom at any depth is critical. Whopper bluegills and shellcrackers can be notoriously wary, and it's often necessary to be very quiet and fish for them from a distance. Put your boat on top of them—when fishing with a cane pole, for example—and you're likely to spook them.

Jack has also discovered another important benefit to his technique—it doesn't get hung up or collect weeds as readily as other rigs.

"Let's say you make a cast into the shallows next to the bank, but don't get a bite," Jack explains. "You decide you'd like to try a bit farther out where the water is deeper. With a fixed-float rig, you can drag it to the spot but, when you do, you are dragging your bait sideways, and it is more likely to get snagged or pick up weeds. Besides, that predetermined depth is going to be wrong anyway, so you really have no choice but to reel it in, readjust the float or line stop knot to what you hope is the right depth and recast."

However, with the fully free-sliding float, Jack says you can move your bait from one spot to another by simply reeling in some line and pulling the float into position. The bait tends to rise vertically under the float rather than dragging sideways so you're far less likely to get

By allowing the bait to slowly sink *to the bottom, the sliding-float rig developed by Jack Avent (below) provides a highly effective way of covering the entire water column for whopper shellcrackers and bluegills.*

hung or pick up weeds on the hook. When you've moved the free-sliding float to a new location and released the line again, the bait simply drops straight back to the bottom. No matter how far you're fishing from the boat or bank, your bait rises and falls vertically when you move it.

One of the best things about this rig is that it works so well on light and ultralight spinning tackle. Jack prefers to fish a 6-foot, ultralight spinning outfit rigged with a free-sliding float on 6-pound test line, although he may occasionally use 8-pound test if the fish are exceptionally large or the cover is heavy. He's found that big floats are unnecessary, and it's harder to detect a bite with them. Also, small floats are less apt to spook fish when they're cast into shallow water.

He normally uses a small, free-sliding float made of cork, wood or plastic—small English-style floats are ideal—but he has also used those small, round plastic floats that have a push-button, spring-loaded wire clamp that holds the line. By adjusting the wire clamp to one side so that it remains open, the line can run through it.

Through trial and error, Jack has learned that he gets fewer tangles while casting if he rigs his terminal gear a specific way (see "Rigging the Free-Sliding Float"). He seldom has a tangle when he uses two BB-sized split shot (or slightly larger) with the first pinched on the line 4 to 5 inches above the hook, and the second 4 to 5 inches above that.

Live crickets or red worms are both highly effective for bluegills and shellcrackers. However, Jack believes that red worms may have an edge for shellcrackers. Less readily available, but also effective, are grubs, wasp larvae and catalpa worms (turned inside out on the hook).

One of the best things about the free-sliding float is that it's the perfect "search" rig to help you find whopper bluegills and shellcrackers. Regardless of the depth of the water, your bait is always in the prime zone, and you can more quickly and thoroughly check out likely spots. If you know a pond or lake holds big panfish, it pays to hunt for them. In early spring, especially when the moon is full, you want to look for big panfish in relatively shallow water where they gather in large groups to fan out circular beds and spawn. Most often, the beds will be in water only 1 to 2 feet deep, and you can usually see them. Bluegills and shellcrackers will also continue to spawn at intervals through the summer but, as the season progresses, they tend to bed in deeper water—4 or 5 feet deep.

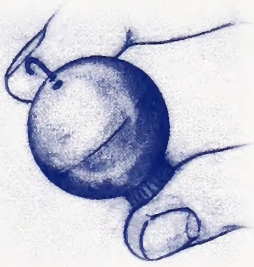
During the summer months, the fish are somewhat scattered and may be at depths of 8 to 10 feet or more. Yet, fish of the same size still tend to travel in loose schools. They're harder to find then, but if you're looking for sizable bluegills and shellcrackers, the trick is to stay on the move trying different spots and depths until you catch a big one. Then, if you concentrate on that area, chances are pretty good that you'll catch more of the same size.

A few of the ponds Jack and I fish hold bluegills and shellcrackers in the 1- to 2-pound class, but with Jack's free-sliding rig, we can usually find them. That's when the light-tackle fun begins. Jack calls them "two-minute" bream because it can easily take that long to corkscrew one out of the water on ultralight spinning gear.

Give Jack's rig a try and chances are you'll agree that it's the deadliest panfishing tactic you've ever used. ⊠

Rigging the Free-Sliding Float

Choose a small float made of cork, wood or plastic with a hole through it that will allow it to slide freely up and down the line. You can also adjust a small, round plastic push-button float so it doesn't clamp your line by depressing the button and turning the wire clamp to one side so that it remains open. For best results, choose a round float that is about the diameter of a quarter, or smaller.



Slide the float on the line and tie on a long-shank, wire bait hook (Jack Avent likes a No. 4 Tru-Turn hook). Use pliers to pinch a BB-sized (or slightly larger) split shot 4 to 5 inches above the hook. Pinch a second split shot the same size 4 to 5 inches above the first shot. The use of two small split shot, and their spacing, will help prevent tangles when casting. In use, the float will usually lie on its side when your bait reaches the bottom, but you can still detect movement that signals a bite.

HAWK OF THE BOTTOMLANDS

Once considered threatened, the red-shouldered hawk is making a rebound in North Carolina. Meet this keen hunter of the bottomland forest.

written by David S. Lee ©2000 / photographed by Derrick Hamrick ©2000

***High atop a tree** in the Neuse River bottomland, this female red-shoulder incubates several eggs in her nest. Males also help with incubation.*

The scream is usually repeated five to 12 times. "*Kee-ah! Kee-ah*" is what it sounds like, but that hardly does justice to the cry of the red-shouldered hawk. The first syllable is accented and the second is drawn out and has a downward inflection. It is loud and carries well, a sound best appreciated on a mild afternoon when pale green traces of leaves-to-be are not yet shading a wooded glen. After a few minutes of silence, another volley of calls follows, and then another. The vocalizations are as much a proclamation of spring as a chorus of spring peepers or a woodland dotted white with bloodroots.

The red-shouldered hawk has long been my favorite hawk, although I'm not sure why. Perhaps it was because the species was threatened in North Carolina in the mid-1970s. During the previous two decades it

***The red-shouldered** hawk feeds her two-week-old chicks (above). The male brings food to the female and nestlings until the chicks can be left alone (below). Small mammals, reptiles and amphibians comprise the bulk of the hawks' diet.*

had shown a 65 to 74 percent population decrease in the state and was doing poorly in other Eastern states as well. Fortunately, the maturing of bottomland hardwood forests, heavily cut over in the early 1900s, has provided suitable habitat, and the species once again has become a common bird in our alluvial forests and swamps. The red-shoulder is a true native of these swampland habitats, and perhaps that's the reason why I'm fond of this bird. Or maybe it's just its dependable and constant vocal pronouncement of spring that I appreciate.

For the last 25 years I have had the good fortune of having a pair of red-shoulders living in my yard. These hawks are monogamous and retain the same territory for life; the species is known to live for up to 20 years. So it is likely that for much of this time I've had the same family of red-shoulders in my yard.

The screamlike calls are not just used for staking territory but are also sounds of alarm. When I step outside, the hawks start calling, and when really agitated by my presence they scream "*Kip*!" and "*Keeyip*!" with ear-piercing frequency. Over the season they pay less and less attention to our two golden retrievers or me. I used to think of this as conditioning but now understand that the hawks become less vocal as their nesting cycle advances. By the time the nest contains young, the red-shoulders are usually quiet and secretive when around the nest, and the few screams I hear come from distant points in our wooded lot. The brooding female sometimes stares down at me, but usually she pays little attention, focusing instead on her mate returning with some choice food offering for her or her chicks. At times she sits on the nest giving a soft "*Kee*" call while the male is away hunting. When both parents are delivering food to the chicks the adults are very quiet around the nest. Their screams start up again in late summer and fall every time a migrant hawk passes overhead.

People adopt different rituals for marking the passing of events like birthdays, holidays and seasons. One of my obligations to spring is listening to red-shoulders. Time squandering? Perhaps, but I enjoy it.

Habitat The red-shouldered hawk is found in bottomland hardwoods, riparian habitats and flooded swamps. In general it prefers extensive forest stands, but individual pairs can make a living in smaller woodlands of several hundred acres. It often feeds in openings of fragmented landscapes but requires large blocks of woodlands for the core of its territory. This species prefers mature forests with open understories, and unlike the red-tailed hawk, which feeds over open fields, or the similar-sized broad-winged hawk, which is a woodland edge specialist, the red-shouldered hawk spends most of its time foraging in the interior of forests. It readily defends its territory from the larger great-horned owl and red-tailed hawks, and sometimes can be found in the company of owl-mobbing crows.

Food In the days before conservation ethics, birds and other wildlife —hawks in particular—were divided into categories of harmful and beneficial. The beneficial category included species that ate rodents and agricultural pests, poisonous snakes and other species not in favor. The red-shouldered hawk, since it did not eat farmyard chickens or game species such as quail and rabbits, was considered a beneficial hawk. In truth most of the soaring hawks (buteos) eat a wide spectrum of foods and there is much overlap in their diets. Nevertheless, each species has specializations, while the percentage of any given food item varies by species range and the season.

The diet of a red-shouldered hawk is 25 percent to 75 percent small mammals (mice, voles and shrews) and 20 percent to 40 percent small reptiles and amphibians. They also eat birds (2 to 5 percent), fish and crayfish (up to 3 percent) and insects (up to 29 percent). I've also seen them eat carrion. Chipmunks are the maximum size prey of this hawk. Red-shouldered hawks hunt from perches high in the subcanopy and from low ones, and they use hearing as well as sight to locate prey.

In late spring, when the young are large and the demand for food is high, it is informative to watch the adults bringing food to the nest. For the last two decades, I have been tracking the reptiles and amphibians that occur in our wooded lot, keeping a mental list of what lives here, learning which species are common, and by default which ones are not. The prey the hawks capture does not compare well with my perceptions of relative abundance. Through my binoculars, I see them feeding their young reptiles and amphibians that I seldom encounter. Occasionally I watch them bring in species I

Birds don't exactly have shoulders, so the name "red-shouldered" refers to the rufous color at the bend in the hawk's wing. The red-shouldered hawk is wide-ranging, occurring over much of North America. In the East it can be found from the eastern edge of the Great Plains and southern Quebec southward to Florida and the Gulf Coast of the United States. It is absent from most of the prairie and Western states, but an isolated population occupies the coastal strip from southwestern Oregon to northwestern Baja. Like many birds, a number of subspecies, or geographic races of the same species, are recognized by ornithologists. For most birds, this geographic variation consists only of subtle differences in plumage and size. Typically, it is necessary to have comparative specimens in hand to distinguish between subspecies, and precise measurements are often needed for positive identification. Not so with the red-shouldered hawks.

The subspecies that occurs in the central and Eastern states (south to the Carolinas) is a large bird with a reddish breast. The northern populations of this subspecies (*Buteo lineatus lineatus*) are migratory. From Charleston, S.C., southward to south Florida the geographic race (*B. lineatus alleni*) is smaller, and its breast is paler. These southern birds have gray heads and backs and are nonmigratory. In extreme south Florida and the Florida Keys, the red-shouldered hawks are even smaller, extremely pale and have dark tail bands.

DAVID S. LEE

The bird shown here is *B. lineatus extimus*. It was photographed near Flamingo in the Florida Everglades. Compare its color and markings to the hawks Derrick Hamrick photographed in North Carolina. Two additional subspecies occur, one along the North American west coast and the other in eastern Texas. Neither is migratory.

As the chicks grow, *their food needs keep both parents hopping (left). The adult hawks maneuver easily in deep forest, able to take small birds on the wing as well as pluck fish from ponds. These two nestlings (below) are engaging in a tug-of-war over a worm snake.*

have never seen in our yard. Last summer they delivered a 2½-foot-long corn snake to their young, and they frequently bring in worm and ringneck snakes and other secretive creatures.

Although they are diurnal predators, it is amazing to see how many nocturnal prey items they procure. Without tearing log piles apart, I would have no idea how to find white-footed mice or toads during the day, yet the mouse is a regular part of their diet and toad delivery is not unusual. And how do they spot the short-tailed shrews in the honeysuckle? Providing an endless buffet of food items, the adults eventually bring in one mouse-sized meal per chick per hour by the time the chicks are about 20 days old. Usually there are two to four chicks per nest.

In spring the adults often hunt around the edges of frog-breeding pools. They just stand next to the pond and pounce on the frogs. On occasion they snatch prey while in flight and can pluck fish from the water's surface. While we most often see red-shouldered hawks hunting in the open, the majority of their foraging is done in the interior of forests and swamps. Except for the accipiters (smaller woodland hawks), which specialize in birds, red-shouldered hawks are our only diurnal avian predator that hunts forest interiors.

Nesting

Red-shouldered hawks also nest in forest interiors, typically near water. The nests are below the canopy at least halfway up large deciduous trees. They are constructed in the crotch near the main trunks, and both parents take part in nest building. The nest is mostly composed of dead twigs but other items are often added (Spanish moss, leaves, tissue paper, twine, corn husks), and the inner depression is lined with shredded bark, mosses and sometimes greenery from live conifers. If nests are successful, the pair may continue to use the same one for a number of years. Females lay two to four eggs and even though both adults incubate, the female does most of the job as well as the chick brooding.

The male delivers food until the chicks are large enough to be left alone. The eggs hatch in about 33 days. Young leave the nest at about six weeks, but depend on the parents for many weeks after they fledge. The young return and roost at or near the nest at night until they are completely independent. These birds normally don't nest until they are 2 years old, so immature birds wander and mostly hunt in upland areas away from the swamps and alluvial forests used by adults for foraging. ⊠

***Six weeks after** hatching, young hawks fledge and leave the nest, but they are not completely independent until many weeks after. Minutes after fledging, this young red-shoulder (right) is awkwardly perching high in a tree.*

building Bigger Bucks

The legal buck harvest for many of the state's hunters will be cut in half next deer season. Many deer hunters aren't happy about the prospect—they're delighted.

written by Chris Powell
photographed by Ken Taylor

On a cold November morning two years ago, I sat in a tree stand all but convinced my morning deer hunt was over. It was approaching 10 a.m., the sun was nearing full bloom, and I had seen nothing more than a few rambunctious squirrels. I was perched atop a new stand my father and I had put up the summer before, overlooking a deep logging ditch bordering part of my grandmother's farm. A wide oak had fallen across the ditch, and the deer and other wildlife had been using that tree as a bridge, wearing its decaying topside almost flat. This was the area for a stand, we had thought, good as cash money. But after hunting the best part of the morning during the first good day of the rut, I could account for nothing. Maybe that's why the sound of steps coming from off to my right caught me so off guard.

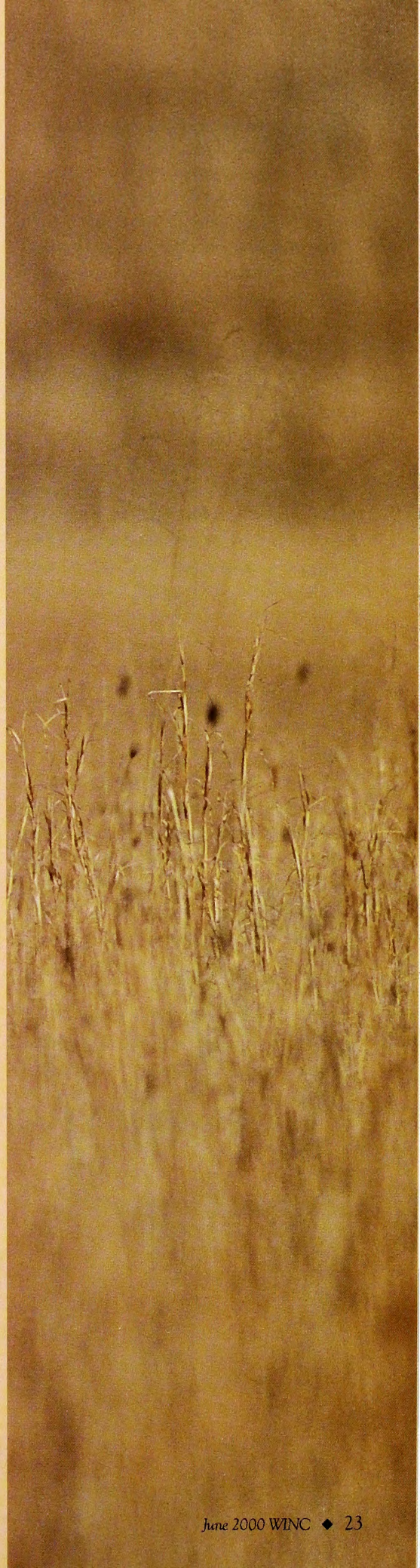
Riled up and looking for female company, the young buck practically skidded to a stop when he hit the doe-estrus scent line I had laid out earlier. Steam blew from his nose as he locked onto the scent, and he made a course toward and slightly behind me.

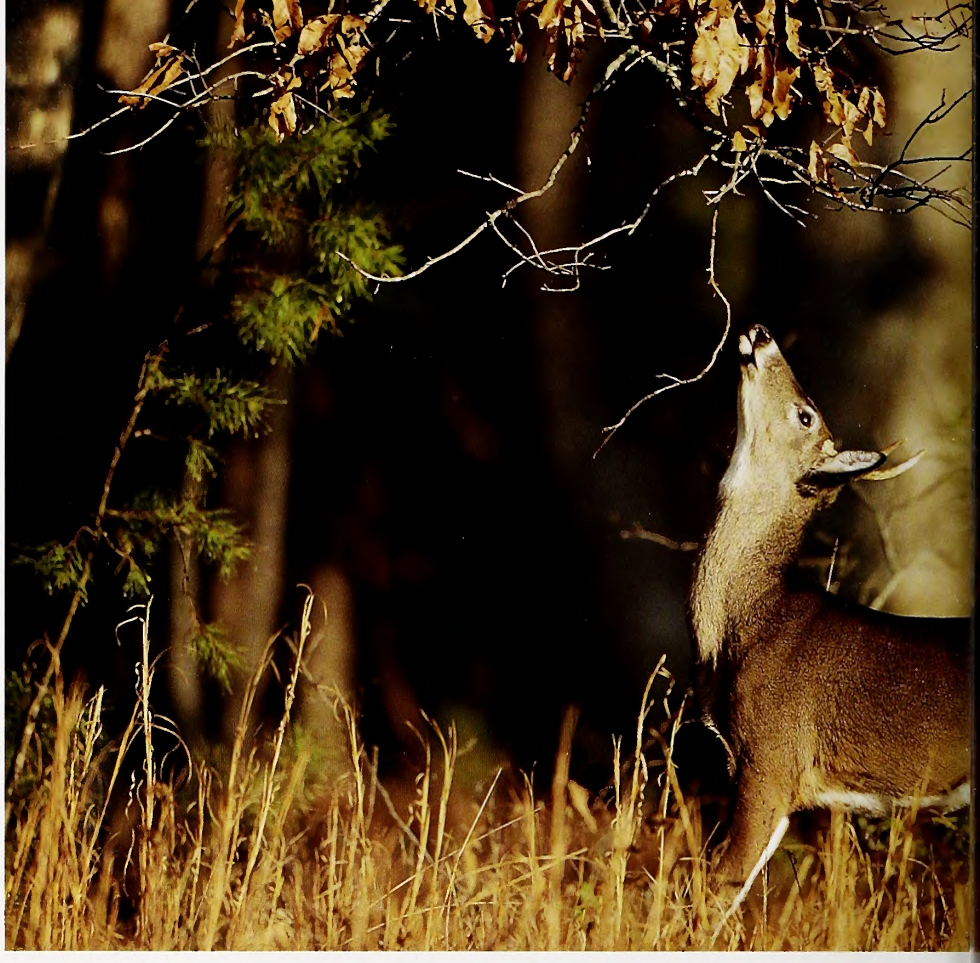
I couldn't have been more unprepared. I had brought along my rifle expecting a clear 50- to 75-yard shot at a stationary deer in front of me. What I faced instead was a buck 10 yards away, power-walking through thick cover. And of all the rookie mistakes. My scope had been left on the same setting used two weeks earlier to zero in the gun—at 100 yards! So when I raised my rifle, instead of seeing a deer, I saw a scope full of hide. Instead of seeing trees, I saw bark.

Long story short, the trigger was never pulled, and I remember shaking violently as I watched the smallish five- or six-point rack disappear into the woods. For a split second, I definitely had an opportunity, but not a good one. Maybe I feared a wounding shot; maybe it was the small rack. Regardless, the trigger was never pulled.

I've had a lot of time to laugh at myself and think about that morning, and I'm not sure what would have happened if the events had unfolded in my favor. With the amount

***What does it take** for a buck to grow a rack this size? Longevity. Most bucks never survive past a year and a half. But the Wildlife Commission is taking steps to ensure more survive into adulthood.*





***Once-a-spike**-always-a-spike used to be a common misconception. But hunters are now realizing that many spikes, if allowed to live until next year, are capable of growing trophy-sized racks.*

of adrenaline coursing through my veins at the time, that buck may have very well gone down. And a rack would have been sawed off worthy of no more display than the wall of our farm's tractor shelter.

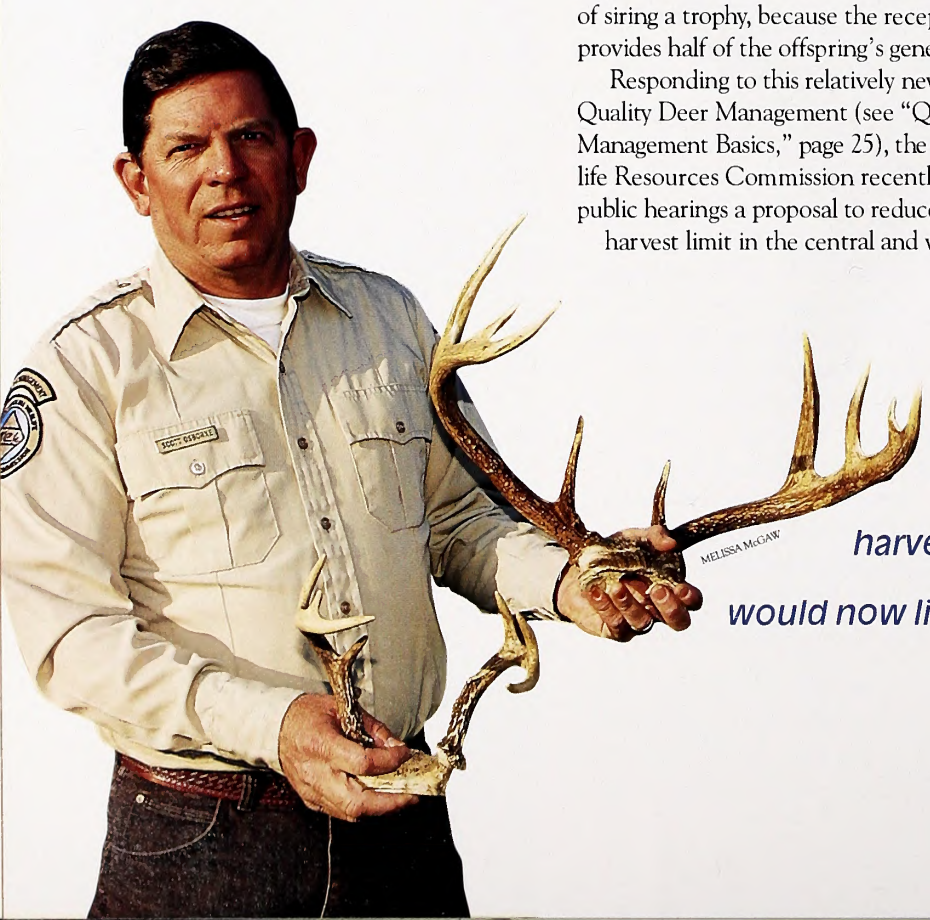
Similar situations are playing themselves out each deer season as more and more hunters let young bucks walk. Educated by a slew of big-game magazines, sportsmen are realizing that this year's young five-pointer can become next year's respectable eight and the following year's trophy. Hunters have also begun accepting the need to harvest does to manage for balanced herds and larger bucks.

It wasn't that long ago that hunters believed most does should be spared to create a larger breeding stock. It was also thought that larger-rack bucks should be saved for their "superior" genes, and spikes and cow-horns removed because of their "inferior" genes.

However, it is now common knowledge that an overabundance of does significantly hinders buck populations. Biologists also have proven that some spikes born later in the year are genetically capable of growing trophy racks the following year, if provided ample habitat. Conversely, other spikes may be genetically "hardwired" to grow only small racks. Finally, a spike or cow-horn does have the capability of siring a trophy, because the receptive doe provides half of the offspring's genes.

Responding to this relatively new desire for Quality Deer Management (see "Quality Deer Management Basics," page 25), the N.C. Wildlife Resources Commission recently took to public hearings a proposal to reduce the buck-harvest limit in the central and western seasons from four to two bucks for the upcoming hunting season. The hearings revealed that a wide majority of hunters support the new limit, and the Commission adopted the change at its February meeting. (Because the limit is not widely supported in the dog-hunting areas, the counties in the Eastern season and those Central counties where dog hunting is allowed will remain at the four-buck limit. The overall season limit of six deer per hunter will remain unchanged for all areas.)

Support for the two-buck limit was particularly telling to Scott Osborne. The Wildlife Commission's Big Game Program coordinator took a similar proposal to public



MELISSA McGAW

"I think many of our hunters have reached a point where they have harvested a number of smaller bucks and would now like to harvest a nice-sized one."

—Scott Osborne

hearings a few years ago, only to see it shot down. "There is no doubt that our hunters are getting better educated about the relationship between the age of the buck and its quality," Osborne said. "Most of our bucks never live past a year and a half, and I think many of our hunters have reached a point where they have harvested a number of smaller bucks and would now like to harvest a nice-sized one."

By reducing the number of legally harvested bucks, biologists believe that hunters will be more selective, understanding that if the two antler tags are filled by November, a hunter wouldn't be able to legally take the deer of a lifetime in December. Also, big game managers are hopeful that the change will shift more hunting pressure to does, which outnumber bucks in most areas.

What is unknown is how many hunters will comply with the law. Some, having filled their two buck tags, will undoubtedly succumb to temptation if a large rack happens to present itself. On the other hand, many honest hunters will likely fill just one antler tag the entire season, keeping the remainder as insurance.

"This would result in a one or no-buck limit for some hunters," Osborne said. "The success of this effort will depend on a number of factors—how much the buck harvest will be reduced; how many of the extra bucks will be taken by our previously less successful hunters; how much the doe harvest will change; what kind of habitat is available. And a lot depends on compliance."

Because bucks begin growing sizable antlers by age three, the effectiveness of the new limit should be known relatively soon. Osborne estimates that the new law could potentially reduce the number of harvested bucks by 15 percent, which would equate to 8,000 more bucks surviving per year in the affected areas.

But the new limit is not without its critics. While a few hunters prefer quantity over quality, most of the new limit's opponents aren't against better bucks, just the way the Wildlife Commission is going about it.

Kevin Young, of Durham County, believes North Carolina has simply become too urbanized for bucks to survive to any significant age. "In Durham County, with the metropolitan area we have, what bucks you do let walk I've noticed are getting killed on the road anyway," Young said. "I don't see how we are going to get any better quality deer."

Troy Smith, of Caswell County, said that the new law would be more effective if button bucks (young male deer with barely visible antlers) were not counted as does. "In 1998-99, there were more than 9,500 button-heads killed, and if you could cut that in half, think about how many bucks there would be," Smith said.

Mark Looper, of Granite Falls, wants larger bucks but thinks a point restriction would get better results. Such a restriction would require that a buck have a minimum number of points on its antlers before it could be harvested. "If they want to increase the buck population and the quality," Looper said, "then they need a point restriction. They are not benefiting us by cutting back to two bucks because small bucks are going to still be killed. But if they would use a point restriction, the buck population would double because three-fourths of our deer are a year and a half old."

And though Steve Rolland, of Durham, understands that hunters need to harvest more does and fewer young bucks, he believes the two-buck limit will make dishonest hunters out of people who were previously honest. "People are going to kill these bucks intentionally or not; they just won't report them," he said.

Quality Deer Management Basics

The Quality Deer Management concept was first popularized by wildlife biologists Al Brothers and Murphy E. Ray Jr. in their 1975 book *Producing Quality Whitetails.*

Quality Deer Management is based on the principle that, historically, the ratio of females to males has been closer to 1-to-1, the number of each sex that are born every year. Because of this, deer have evolved social behaviors that are dependent on an equal number of the opposite sex. For example, a balanced herd causes more competition among bucks, with mostly dominant mature males passing the genes to the next generation. Also, a herd with fewer does per bucks results in a shorter, more-intense rut period because the available does are more quickly bred.

Today, however, with imbalanced herds that can average 20 bucks per 100 does, bucks are not forced to compete for does, resulting in superior and inferior genes being passed on alike. Also, because not every doe can be bred by so few bucks, some does will stay in estrus, which abnormally prolongs the rut. Does that are bred during the later part of the season bear fawns after the period of optimum nutrition during the spring and summer, according to David Guyn, a professor in the Department of Forestry at Clemson University.

Founded in 1988, The Quality Deer Management Association (QDMA) is a national nonprofit group based in Watkinsville, Ga. The mission of QDMA is to promote ethical hunting, sound deer management and positive relationships among landowners, hunters and wildlife managers.

Brian Murphy, executive director of the QDMA, says the organization has 8,000 members in 46 states and five countries. "Within every state throughout the country, there is a rapidly increasing participation by hunters in Quality Deer Management. It is rapidly becoming the accepted way of managing deer herds," Murphy said.

To contact the QDMA, call (800) 209-DEER. QDMA's Internet address is: http://www.qdma.com

***To see more bucks** like the one shown above, biologists believe hunters need to reduce the high population of does throughout our state. Hunters will play a crucial role in the success of the Wildlife Commission's Quality Deer Management program.*

Those may be good points. But much of the state is still rural and a large percentage of bucks are going to survive the highways if first spared the bullets. Also, a harvested button-buck is counted as a doe because hunters can't easily distinguish between the two. With the state's doe population bulging at the seams, the Wildlife Commission isn't going to do anything to deter their harvest. A point restriction is an option used by other states; however, the two-buck quota should achieve similar results while allowing hunters to decide for themselves what a quality deer is. Finally, it's true, some hunters aren't going to play by the rules, but the Wildlife Commission is betting that the majority are going to take the Quality Deer Management concept to heart.

"I think it will help to a certain extent," said John Long, of Wilkes County. "I wouldn't mind seeing a temporary one-buck or no-buck limit. That would definitely help the size of the bucks and reduce the doe herd."

Jimmy Lee Mcinnis, of Iredell County echoes that sentiment. "I would go along 100 percent if they would make the season antlerless deer only for about four years, and then bring it back to two bucks a year. That way we would have big-rack bucks," he said.

Those statements illustrate the commitment many sportsmen feel to the idea. But in reality, most of the two-buck limit's proponents are people like Rutherford County hunter Scott Fisher, who thinks any attempt to promote balanced herds is a step in the right direction. "I personally believe if we are ever going to have a trophy buck hunt in North Carolina, we are going to have to stop taking young bucks and start harvesting more does," Fisher said. "And I hope all the other sportsmen will go along with this too."

The Quality Deer Management approach is already being applied by some deer-hunting clubs, which have developed unique methods for encouraging selectivity among their members. The hunting club I once belonged to uses a 5-gallon bucket rule: If the harvested deer's rack fits inside a 5-gallon bucket, the hunter pays a small fine that goes into the club's operating fund. (Ribbing from fellow hunters is the real deterrent.) Some clubs require hunters to harvest a certain number of does before they can take a buck, or a doe for every buck. Still other clubs use point or even weight restrictions.

As for myself, this admitted horn-hunter has developed his own system for determining what qualifies as a shooter deer. I'm only going to pull the trigger if the rack is worthy of a spot over my fireplace. An animal of such majesty deserves nothing less. And I've also decided to take at least one doe a season and encourage my hunting partners to do likewise.

This past year, while scouting a hunting spot on my grandmother's farm, some friends and I jumped a large-bodied deer near the spot where I had passed up that young buck two years before. He rose up and was gone in a flash, but I got a pretty good look at that high rack bounding off into the woods. Was it my imagination, or did it bear a resemblance to that first young buck I let walk? I'd like to think so. And I can't imagine what he might look like this year. ⊠

What Other States Are Doing

The N.C. Wildlife Resources Commission is not alone in promoting quality deer management. A number of Southeastern states have implemented programs designed to promote balanced herds. Some of those states are adjacent to North Carolina, and their programs will have a residual effect on our perimeter herds. The following is a breakdown of various wildlife agency deer programs.

Virginia – During the early 1990s, Virginia implemented a bonus-tag regulation that allowed hunters to take an unlimited number of bucks. Recently, however, Virginia's Department of Game and Inland Fisheries has established a two-buck limit in the western half of the state and three-buck limit in the eastern half. "We've been able to keep our doe harvest right where we want it and have been right on track with our deer harvest projections," said Matt Knox, the deer program supervisor for the Virginia Department of Game and Inland Fisheries. "Also, we have seen a very real change in hunter selectivity during the last decade. It's due to a change in the mentality of deer hunters. They are passing up small bucks, and what they're doing is creating an older deer structure. We have 600 clubs in DMAP (Deer Management Assistance Program), and those clubs are getting older bucks."

Tennessee – Two years ago, the Tennessee Wildlife Resources Agency reduced its buck limit from 11 to two for central and western Tennessee, and from seven bucks to two in eastern Tennessee. After the first season, about 75 percent of the hunters favored the change, but because of some resistance, the buck limit was changed to three the following year. Ben Layton, deer project coordinator with the Tennessee Wildlife Resources Agency, said that under the two-buck season, 19,000 fewer antlered bucks were harvested than the previous season. "After the two-buck limit, we had 63 percent yearling bucks in the harvest, which is our lowest percentage of yearlings in the total harvest that we have ever experienced," Layton said.

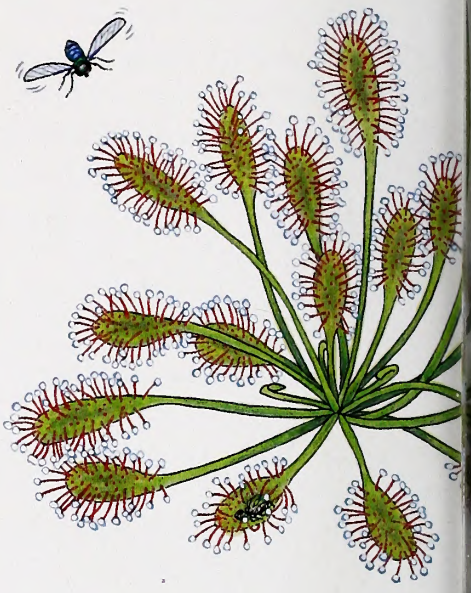
Georgia – In the early 1990s, the Georgia Department of Natural Resources created a program whereby supportive counties could implement one of two antler restrictions, with a statewide two-buck limit. The two options include either a 15-inch outside spread measurement of the rack's main beam, or a minimum of four points on one side of the antlers. In order for a county to participate in either of the two options, the resident hunters and landowners are polled. Each group must support an option by a 66-percent margin before the program is implemented. As of next season, six counties will be enrolled in the program, said Scott McDonald, a senior wildlife biologist with the Georgia Department of Natural Resources. Because of the smaller scale, Georgia wildlife biologists haven't been able to document any increase in age structure.

Arkansas – Responding to the prevalence of heavy buck-harvest, the Arkansas Game and Fish Commission implemented a regulations change in 1998 that defined a legal buck as having at least three points on one of its antlers. The end of the main beam constitutes one point. However, deer with both antlers less than 2 inches long are considered antlerless. At the same time, Arkansas increased the bag limit on antlerless deer, which gave hunters more harvest opportunities in many portions of the state.

Michael Cartwright, deer/elk program coordinator for the Arkansas Game and Fish Commission, said support for the changes has been high. "The program hasn't been around long enough for us to note significant improvements in herd age or sex ratios," Cartwright said. "However, the 1998 reported statewide antlered buck harvest dropped significantly by 41 percent. The antlerless deer harvest increased by 67 percent."

A tiny fly hovers above a rosette of leaves, sparkling with "dew." Watch out, fly! Get any closer, and you'll be stuck in

Mother Nature's Flypaper



written and illustrated by Consie Powell

WONDERFUL ADAPTATIONS

All plants have certain basic needs that include sunlight, oxygen and carbon dioxide from the air and water, and certain minerals from the soil where they grow. Various plants have evolved to adapt to habitats that may lack one or more of these basic needs. Shade-loving plants have adapted to reduced sunlight and desert plants have adapted to very low water levels.

Carnivorous plants have adapted to habitats that lack minerals needed for growth. They are found in mineral-poor, acidic **bogs** and **savannas** and in freshwater **marshes** and **swamps**. By evolving the capacity to trap and digest small organisms, carnivorous plants can obtain the necessary minerals that are missing in their habitats.

Four PITCHER PLANT *species grow in wet bogs and savannas of North Carolina. Their leaves are tubular with a lobe at the top called a lid or hood. Bright green, red, yellow or white coloration, plus nectar secretions along the edges of the lid, lure crawling and flying prey to the pitcher opening. Stiff downward-pointing hairs inside the lid encourage prey to descend into the tubular trap. Many insects simply fall in after crawling to the lid or edge of the pitcher. The downward pointing hairs and a smooth waxy surface inside the pitcher usually prevent prey from crawling back out. Digestive fluids excreted by glands within the pitcher digest the prey.*

SUNDEWS grow in boggy places. Each leaf has a narrow stem and a broad blade modified into a flat trap. It is covered with stalked red ***glands*** *that produce a sticky dewdrop-like secretion. Insects lured by the color or secretion land and become stuck. The longer-stalked outside glands then slowly bend to the center, securing the prey in the digestive area. Sundew flowers are produced on tall spikes containing five to 30 buds which bloom in succession up the spike. Five sundew species grow in North Carolina.*

The three species of **BUTTERWORTS** *found in North Carolina are fairly inconspicuous unless flowering. The trap is quite simple. The leaves are covered with nearly microscopic, stalkless glands. Small prey landing or crawling on the leaves are mired down in glandular secretions and are held fast until digested. The rolled edges of the leaves may curl in on the prey to aid digestion, but they never curl so quickly as to actually assist in capture of the prey.*

MARVELOUS MODIFICATIONS

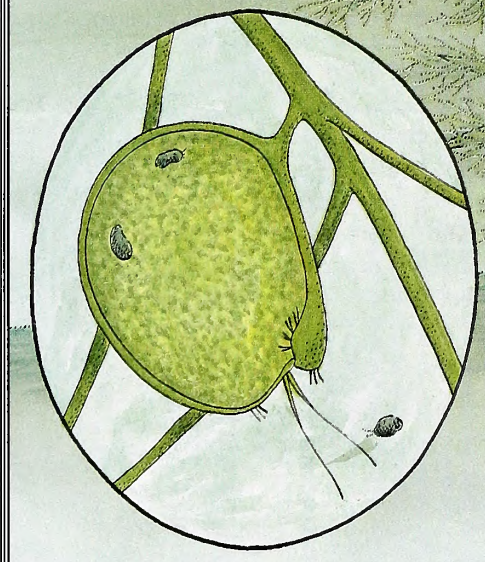
The traps on carnivorous plants are modified leaves. Active traps, such as those on the Venus's-flytrap and bladderworts, use a rapid plant movement to trap and hold prey. Passive traps, such as pitcher plants, sundews and butterworts, lure prey into a part of the plant from which it cannot escape.

VENUS'S-FLYTRAPS *thrive in moist, sandy, acidic savannas. They produce clusters of small white flowers on long stems raised above surrounding grasstops. Each leaf has a broad stem and a blade that folds in the middle and is modified into a trap. Around the outside edges of each blade are stiff guard hairs and tiny nectar glands. The inside half of each trap has three trigger hairs and is lined with small digestive glands. When a trigger hair is moved, the trap closes rapidly until the guard hairs mesh. It finishes closing slowly until the margins of the trap touch. The trapped insect is digested in three to five days, then the trap reopens.*

ENJOY THEM IN THE WILD

Though carnivorous plants are found in many parts of North America, the Southeastern Coastal Plain of the United States, which includes part of North Carolina, is the richest area in our country for both the number of species and the total population of carnivorous plants. Certain plants, such as the Venus's-flytrap, are found nowhere else. Like all wildflowers, carnivorous plants should never be disturbed. They are well adapted to their habitats, but picking or transplanting causes individual plants to die and threatens the species.

BLADDERWORTS *include terrestrial species, which grow in damp, sandy soils or wet, boggy areas. They also include aquatic species, which grow in quiet, acidic ponds, bog-related waters and in roadside ditches. The main part of each plant is underwater or below ground. The plant is a rootless, branching stem from which grow green feathery branches sporting numerous tiny bulb-shaped traps (below). Each trap has a small opening surrounded by trigger hairs and guarded by a closed door that opens inward. Specialized glands in the trap absorb fluid, thus creating lower water pressure inside the trap than outside it. When a tiny organism disturbs the sensitive trigger hairs, the trap door opens and water containing the prey is sucked into the trap. The door snaps shut again, all in a fraction of a second. The trap resets in 15 to 30 minutes by readjusting the water pressure, and the trapped prey is digested over several days by enzymes.*



What Does It Mean?

carnivorous: to eat flesh or meat, or in the instance of plants, small invertebrates

bog: an acidic freshwater area that is constantly moist or wet and is dominated by mosses and herbaceous plants

savanna: a sandy bog with short grassses and sedges and with widely scattered longleaf pines; sometimes called a grass-sedge bog

marsh: an area of fresh, salt or brackish water with tall sedges, grasses and reeds sticking out of the water

swamp: an area of moist ground and water

gland: a structure of one or many cells that secretes a substance

Read and Find Out

- *Carnivorous Plants* by Adrian Slack, The MIT Press, 1980.
- *The Carnivorous Plants* by Francis Ernest Lloyd, Dover Publications Inc., 1976.
- *Carnivorous Plants of the United States and Canada* by Donald E. Schnell, John F. Blair, Publisher, 1976.
- *Plants Bite Back* by Richard Platt, DK Publishing Inc. 1999.
- *Wild Flowers of North Carolina and Surrounding Areas* by William S. Justice and C. Ritchie Bell, University of North Carolina Press, 1968.

In *Wildlife in North Carolina*

- "The Alluring Pitcher Plant" by Lawrence S. Earley, June 1983.
- "Life in a Death Trap" by Lawrence S. Earley, August 1993.
- "A Most Wonderful Plant" by Lawrence S. Earley, November 1993.

Get Outside

Visit the North Carolina Botanical Garden in Chapel Hill to see a lovely collection of many carnivorous plants. Take along your hand lens or magnifying glass so you can get a close-up look at the tiny glands. Don't forget your sketchbook or camera; a visit to the Botanical Garden affords an excellent opportunity to see many of these fascinating plants in one place.

See carnivorous plants in the wild: Although carnivorous plants are not common, they grow in profusion in certain places. Some spots to visit where you can see wild carnivorous plants include Carolina Beach State Park, Holly Shelter Game Land in Pender Country and Green Swamp Preserve in Brunswick County.

Editing and design by Consie Powell.
Art puzzle by Anne Marshall Runyon.

It's WILD!

Project WILD Activities for teachers and students that correlate to this topic include:

Rare Bird Eggs For Sale: teaches students to examine the consequesnce of collecting wildlife and wildlife products, including plants.

What's For Dinner?: teaches students that all animals depend on plants for a food source, and that plants ultimately need animals too.

Which Niche?: teaches students to understand the concept of an ecological niche.

Water Plant Art: teaches students to identify aquatic plants.

Get WILD

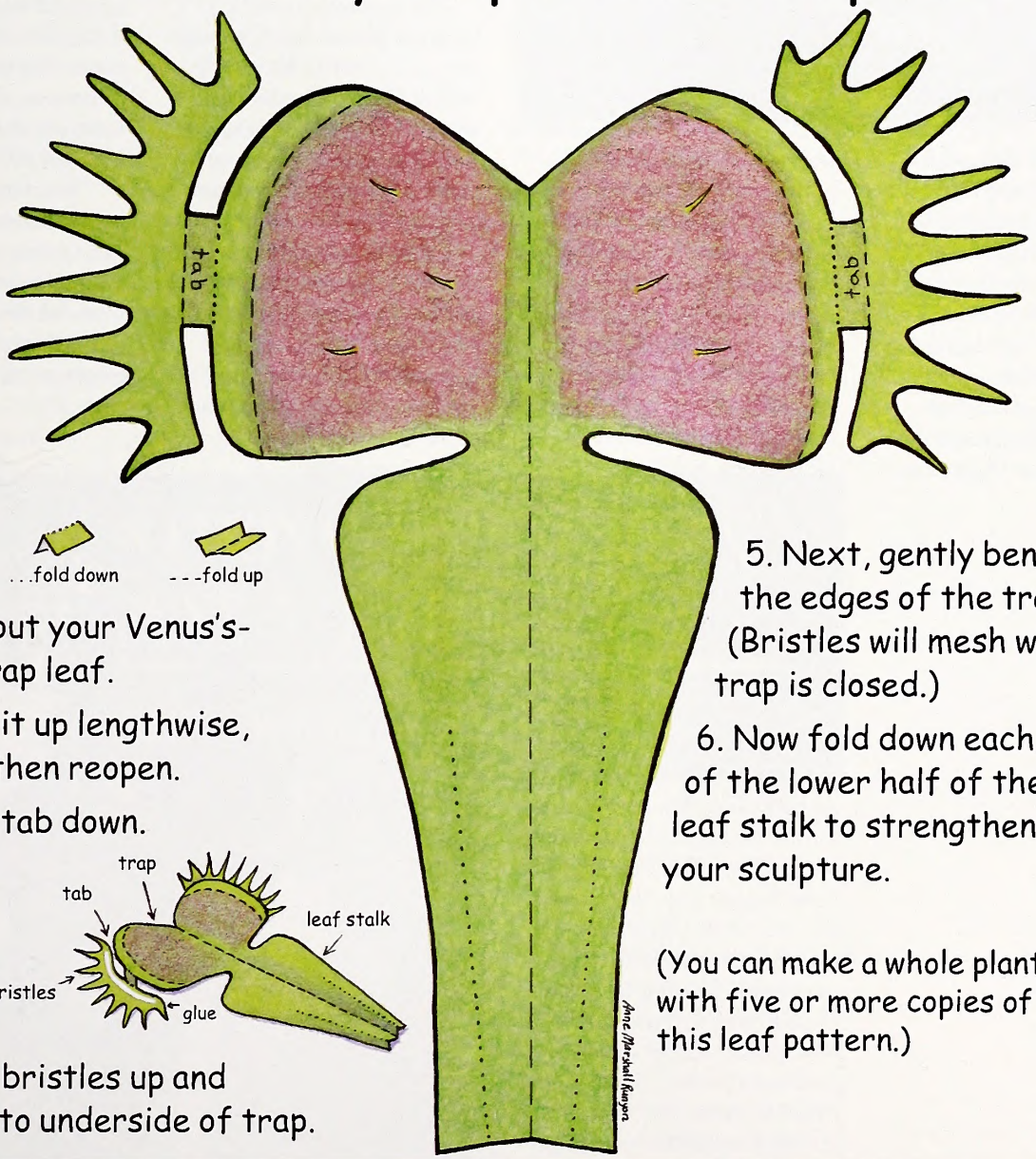
Advanced WILD Workshops:

June 2-3 – *Foxes, Wolves, Coyotes*, SciWorks Environmental Center, Winston-Salem. Contact Kelli Johnson, (336) 767-6730.

June 19-20 – *Mountain Stream Ecology*, Pisgah Center for Wildlife Education. Contact program coordinator, (828) 877-4423.

July 11-12 – *Wildlife Technology*, North Carolina Forest Service Training Center, Crossnore. Contact T.M. Lemon, (336) 957-4382.

Venus's-flytrap Leaf Sculpture



1. Cut out your Venus's-flytrap leaf.
2. Fold it up lengthwise, and then reopen.
3. Fold tab down.

4. Fold bristles up and glue to underside of trap.
5. Next, gently bend up the edges of the trap. (Bristles will mesh when trap is closed.)
6. Now fold down each side of the lower half of the leaf stalk to strengthen your sculpture.

(You can make a whole plant with five or more copies of this leaf pattern.)

Anne Marshall Kenyon

First Telemetry Study of Ruffed Grouse Underway in North Carolina Mountains

LEONARD LEE RUE III

A male ruffed grouse *performs a spring courtship ritual by drumming to attract a female companion. Wildlife Commission and University of Tennessee biologists are attempting to determine how various timber harvesting methods affect ruffed grouse populations.*

University of Tennessee researchers Craig Harper and Dave Buehler, working in conjunction with the N.C. Wildlife Resources Commission, recently initiated the first-ever telemetry study of ruffed grouse in the North Carolina mountains.

The purpose of the study is to examine ruffed grouse use of habitat and how the species responds to different methods of harvesting timber.

"We also will look at population levels, nesting, ecology, drumming sites and mortality patterns," said Gordon Warburton, a Wildlife Commission biologist. "The first question we had to answer, however, was could we even catch enough birds for the study."

The researchers caught 73 birds and placed radio transmitters on 65 (38 females and 27 males). The radio transmitters allowed the biologists to keep track of a specific grouse, providing an unprecedented look at their behavior.

Of these collared birds, 11 were later killed by predators and two by hunters. Based on projections, Warburton estimates that hunter harvests may remove about 10 percent of the birds from the ruffed grouse population.

"The results are very preliminary at this point," Warburton said. "Graduate students have been monitoring birds since September and witnessed broods breaking up during October, then settling down to consistent ranges by November."

Harper and Buehler also conducted drumming counts in spring 1999. Male grouse drum during the spring to attract female mates. The researchers found 15 drummers, which equates to a minimum density of about 1.5 birds per 100 acres.

"The results of this study will help us address the impacts of various timber-cutting practices," Warburton said. "In addition, we should learn more about the types of habitat used by ruffed grouse in our mountains."

—Courtesy of the Division of Wildlife Management

Edited by Chris Powell

Wildlife Officers Strike Gold at Police and Fire Olympics

At the most recent *North and South Carolina Police and Fire Olympics, N.C. Wildlife Resources Commission enforcement officers brought home a number of awards. Front row from left are: Master Officer Barry Joyce, first place in shotgun and third in pistol-team shooting; Master Officer Todd Kennedy, fourth in the Toughest Cop Alive competition; and Senior Officer Chris Elms, second place in the bench press competition. Standing are: Mike Hinshaw, with the Holt Fire Department, first in shotgun and third in pistol-team shooting; Senior Officer Mike Edmisten, Chief Pilot Rick Purcell, first place in the Toughest Cop Alive competition; and Sgt. John Massey, first place in bench press.*

N.C. WILDLIFE RESOURCES COMMISSION

Angler Recognition Program Provides Great Way to Record Your Catch

Want to be recognized for that trophy largemouth that you landed last weekend? Or maybe your son or daughter caught a fine bluegill. Why not get a permanent record of the catch?

Since its inception four years ago, nearly a thousand people have done just that through the North Carolina Angler Recognition Program (NCARP). If your fish meets a minimum citation weight or length, you can receive a colorful certificate suitable for framing that includes the details of your catch and an artist's illustration of the particular species.

Based on the honor system, you simply measure the fish or weigh it on a pair of reliable hand scales. Once you've determined the fish qualifies as a trophy, you can keep it or release it to be caught another day.

NORTH CAROLINA ANGLER RECOGNITION PROGRAM

The Angler Recognition Program shouldn't be confused with the State Record Fish Program, which certifies the largest fish caught in the state. This program requires more stringent guidelines, including the use of certified scales and witnesses.

To apply for an NCARP certificate, use the form on page 29 of the current *Regulations Digest*, and don't forget to send in $5 for processing.

Here are just a few of our biggest catches from last year. Maybe you'll be lucky enough to top next year's list.

- 80 lb. blue catfish. James Davis, Lumberton
- 73 lb. flathead catfish. Lester Todd, Supply
- 46 lb. carp. Nathan Lingerfelt, Norwood
- 31 lb., 8 oz. channel catfish. Matthew Owen, Mount Ulla
- 26 lb., 2 oz. striped bass. Charles Ward III, Greenville
- 11 lb., 15 oz. largemouth bass. J. "Kevin" Pickard, Graham
- 5 lb. 8 oz. smallmouth bass. Keith Dixon, Cashiers
- 5 lb., 8 oz. rainbow trout. Archie Bowman, Mount Airy
- 4 lb., 2 oz. American shad. James McLean Jr., Fayetteville
- 3 lb., 4 oz. bluegill. Jason Beachum, Ansonville
- 2 lb., 14 oz. crappie. Ronald Nelson Jr., Sophia
- 2 lb., 14 oz. hickory shad. Hunter Toler, LaGrange

—Rodney Foushee

Field Notes

- Hatchery-Supported Trout Waters . . . . Open
- Wild Trout Waters . . . . . Year-Round
- Delayed Harvest Trout Waters . . . . . Opens June 3 for harvest

Information on bag limits and other regulations may be found in the *1999-00 North Carolina Inland Fishing, Hunting & Trapping Regulations Digest*. For a copy, check with license agents or contact the N.C. Wildlife Resources Commission at (919) 733-7291.

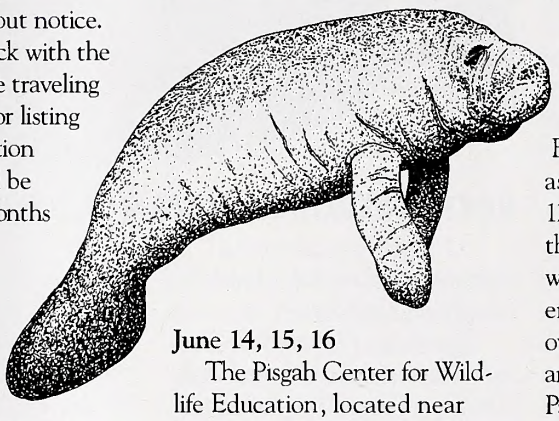
On Patrol

Editor's note: *While most North Carolina sportsmen are law abiding, a few are not. Listed below is a report of a wildlife violation that exemplifies the sometimes humorous situations our North Carolina wildlife enforcement officers encounter while on patrol.*

Sgt. Dennis Mehl and Master Officer Joey Williams were recently checking fishing licenses near Lookout Dam on the Catawba River above Lake Norman when one fisherman produced a license with the name Marie on it. When the sergeant questioned the man about his name, he responded that the license agent must have spelled his name incorrectly, because his actual name was Mario. Sgt. Mehl didn't bite, and further investigation revealed that this "Marie/Mario" fellow was actually named "Roy." Which the officer carefully spelled correctly as he wrote out the citation.

North Carolina Outdoor Calendar of Events

On several occasions, events in this calendar have been changed without notice. Readers should check with the contact listed before traveling to an event. Items for listing should be conservation oriented and should be sent at least four months in advance.



June 11-16

The 18th Annual Fur, Fish 'N Game Rendezvous and Advanced Camp will be held at the Millstone 4-H Center. Campers will study wildlife, forests, aquatic biology, game management and much more. For registration information, call (919) 515-3244.

June 14, 15, 16

The Pisgah Center for Wildlife Education, located near Brevard, will conduct the Eco-Explorers—Everything Fishy program 9 a.m. to 11 a.m. Eco-explorers is a program series for children, ages 8 to 13. Each program focuses on a different eco-investigation that engages children with the natural world. For more information, call (828) 877-4423.

June 17

The Pisgah Center for Wildlife Education, located near Brevard, will conduct the Busy as a Bee program 9 a.m. to 12:30 p.m. The first part of this program, presented by the western region state beekeeper, consists of a comprehensive overview of bees, their habitats and their importance to people. Participants can make their own pillar beeswax candle. The $15 fee for this program includes all candle-making materials. This program is designed for participants ages 16 and up. Please call the wildlife center at (828) 877-4423 for registration materials.

Pass the Paddle for National Rivers Month

With June designated as National Rivers Month, the N.C. Division of Water Resources is coordinating a Pass the Paddle event to bring awareness to all the river watch groups throughout the country.

Groups throughout the nation have been encouraged to hold their river cleanup and celebration events June 3-10.

"We have been trying to get more than 2000 events during that week, nationwide," said Steve Reed, N.C. River Assessment Program manager with the Department of Environment and Natural Resources.

For more information about scheduled river events in your area, call Steve Reed at (919) 715-5424 or Email: steven.reed @ncmail.net.

N.C. WILDLIFE RESOURCES COMMISSION

A group of canoers enjoys a *day paddling one of North Carolina's scenic waterways. All boaters can help celebrate June as National Rivers Month by helping to pick up trash along our streams and rivers.*

Commission Employees Recognized

BODIE McDOWELL

***Perry Harris (left), president of the** N.C. Wild Turkey Federation, presents plaques to Tommy Hughes (second from left), a Wildlife Commission biologist, and Gerry Locklear, a master officer with the Wildife Commission's Enforcement Division. Both Wildlife Commission employees were recognized at the organization's convention in Greensboro for their work in promoting or protecting wild turkey populations.*

Biologist Catches Errors

Dear Wildlife:

There is a boo-boo in the "Nature's Ways" section of your March issue where three skeletal modifications are bulleted. According to the author, "Numerous capillary veins are present in birds that are flyers; these are necessary to get oxygen-laden blood to the flight muscles." Capillaries are not veins, and veins are not capillaries. However, both are "vessels," which would have been a better substitution for the word "veins."

In the article "The Long Wait," there is a photograph of a man holding up a turtle, which the caption refers to as an "alligator snapping turtle." The turtle is just a snapping turtle. We have never had a record of an alligator snapper in North Carolina.

—Richard D. Brown, Brunswick Community College

***Editor's Note:** Mr. Brown is not the only reader to note that the turtle in the photo is not an alligator snapping turtle, but a common snapping turtle. James Sasser, of Howell Woods, who is holding the turtle in the photograph, says he's been talking to puzzled callers ever since the photo was first published in the* Raleigh News & Observer *last fall. The alligator snapper is the largest freshwater turtle in the United States, but is limited to more southern and central states.*

The mistake in David Lee's "Nature's Ways" article was made during the editing. Wildlife in North Carolina *regrets both errors.*

Fish Filleting with Electric Knife

Each year in North Carolina, tons of delicious and healthy fish flesh are wasted by fishermen who don't clean fish properly. Using an electric knife to fillet your fish is fast, easy and effective. *—Soc Clay*

1. Lay the fish flat on the cleaning surface. Use a glove-covered hand to firmly hold the head or body of the fish. Turn the knife on and make a diagonal cut immediately behind the pectoral fin, angling the tip of the blade forward. Slice down to but not through the backbone.

2. With the knife running, turn the blade and cut along the side of the backbone and through the rib cage to the base of the tail fin.

SOC CLAY PHOTOS

3. Cut near the tail fin between the flesh and skin to remove the fillet. Turn fish over and repeat procedure.

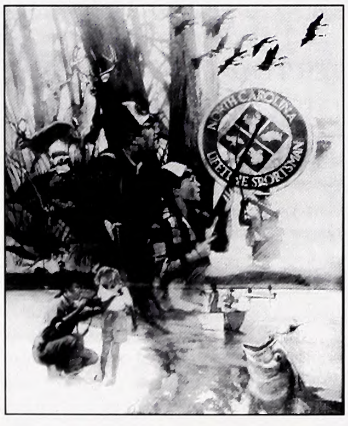
Catch Us at These Numbers

- **1-800-662-7137** to report violations of hunting and fishing laws.
- **1-800-628-3773** (NC VESSEL) for boat registration and titling.
- **1-800-675-0263** for hunting dates and shooting hours for migratory game birds.
- **1-888-248-6834** (2HUNTFISH) to purchase most licenses with VISA or MasterCard using a touch-tone telephone.
- **1-800-446-8663** (I GOT ONE) to report big game harvests.
- Connect to the Commission's online web site at **http://www.state.nc.us/Wildlife/**

The N.C. Wildlife Resources Commission maintains five toll-free telephone numbers to provide better services and convenient access to information for North Carolina citizens. Calls are answered in order, but some numbers may require a wait during busy seasons.

VISA MasterCard

Wildlife Endowment Fund Report



Totals Through March 2000

Principal Balance
$29,850,453.54

Interest Earned
$30,261,918.76

Total Receipts
$60,112,372.30

Interest Used
$18,580,819.04

Fund Balance
$41,531,553.26

Established on May 29, 1981, this fund is derived from the sale of lifetime hunting and fishing licenses and lifetime subscriptions to *Wildlife in North Carolina* magazine as well as from tax deductible contributions. While the interest may be used to supplement N.C. Wildlife Resources Commission programs, the principal remains invested to generate additional interest for the future.

Pond Management 101

by Rodney Foushee

After reading about the virtues of fishing small waters, are you ready to install a farm pond on your property? Maybe you just want to improve the quality of fishing in an existing pond. Here are some pointers to get you started.

Pond Construction: Summer is a great time to build a fish pond. But before you begin moving earth, make sure you have a good idea of the size, shape and location of your new pond. Your local U.S. Soil Conservation Service representative can help take the guesswork out of the planning process by providing guidance, including pond-design options, site selection, construction and cost estimates. You'll also need to contact the U.S. Army Corps of Engineers to make sure the proposed pond is not in a wetland.

With your plans ready, time the construction of your new pond so that it is completed and filled by September or early October. Then you can make the first stocking of sunfish or catfish during the cooler weather of early fall.

Stocking Bass: If you previously stocked a new or reclaimed pond with sunfish last fall, now is the time to stock largemouth bass. Stock ponds at a ratio of one bass for every 10 sunfish fingerlings to achieve a balanced fish population.

Weedy Solution: If bottom weeds are a problem in your pond, consider stocking some plant-eating triploid grass carp. These sterile fish can effectively control aquatic weeds for up to 10 years. Stock at least 8-inch-long carp at 10 to 15 fish per acre to ensure their survival. A permit from the Wildlife Commission is required to stock ponds with more than 150 carp or ponds of more than 10 acres. Only sterile grass carp may be used in North Carolina.

Learning More: If you'd like to learn more about farm pond construction and management, pick up a free copy of the *Pond Management Guide* available at your local Cooperative Extension Service office. This 28-page guide, produced by the Extension Service and the Wildlife Commission, covers the basics of pond management. Another excellent source is the video, *Managing Your Pond for Better Fishing*, produced by N.C. State University. To obtain a copy, send a $25 check payable to N.C.S.U., to: James Rice, Dept. of Zoology, N.C.S.U., Box 7617, Raleigh, N.C. 27695.

N.C. WILD STORE

RARE HABITATS

water-quality issues

Indian remains

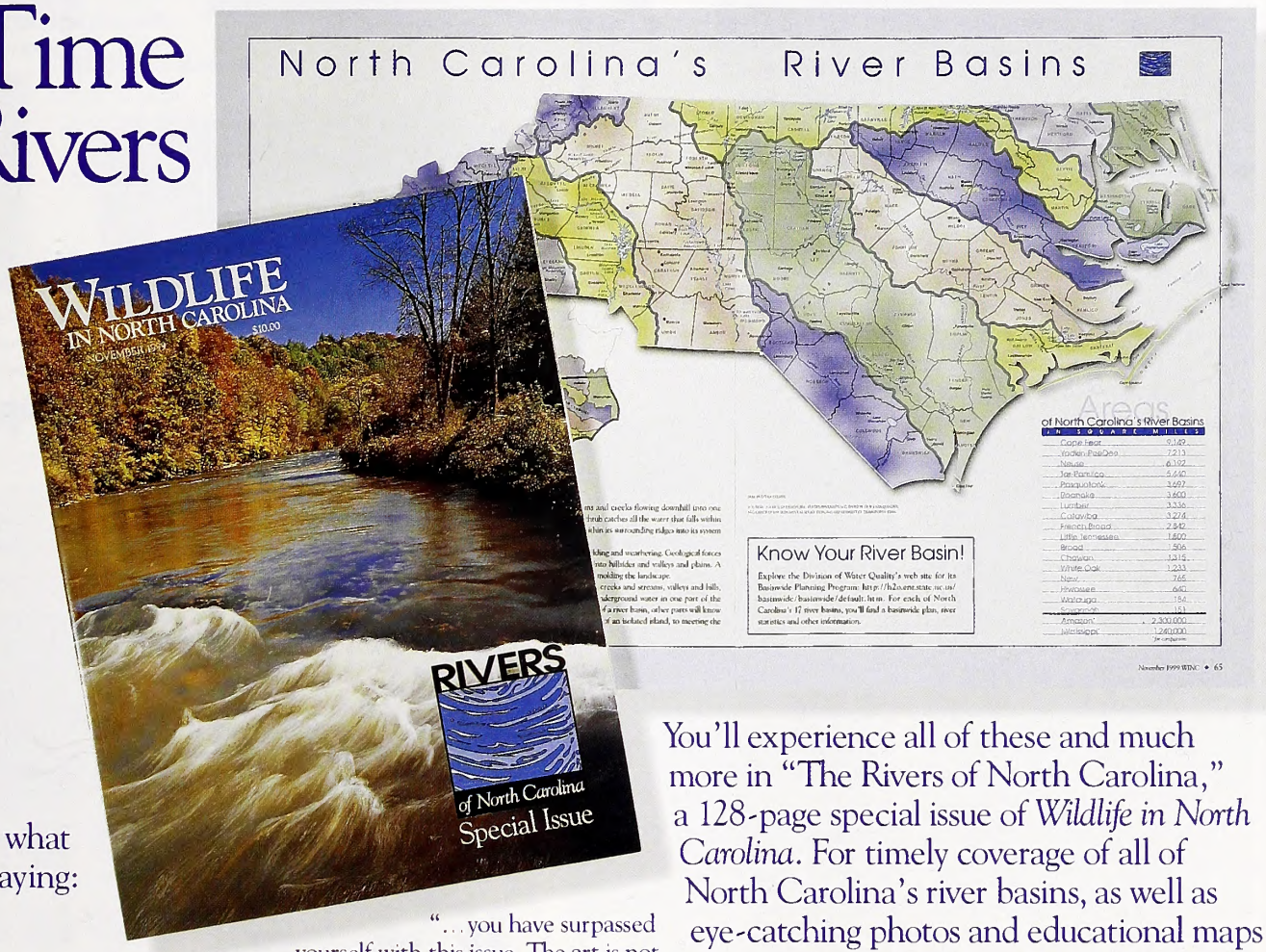
early explorers

the secret life of animals

canoe trips

the real-life stories of people working to clean our rivers

A Time *for* Rivers



Here's what they're saying:

"...you have surpassed yourself with this issue. The art is not just beautiful but illustrative and informative; the photos and charts and sketches of the river basins are put together with a wonderful sense of composition to enhance the articles. ["Rivers of North Carolina"] is a classic."
—Philip Gerard, author of *Cape Fear Rising*

"With excellent writing, photos, and maps, the [special issue] is a beautiful gift to all of us, as well as a wonderful teaching tool for all ages. What a great way to bring in the Year of the Rivers - 2000 celebration!"
—Peg Jones, executive director, North Carolina Watershed Coalition

You'll experience all of these and much more in "The Rivers of North Carolina," a 128-page special issue of *Wildlife in North Carolina*. For timely coverage of all of North Carolina's river basins, as well as eye-catching photos and educational maps and graphics, there's nothing else like it on bookshelves anywhere.

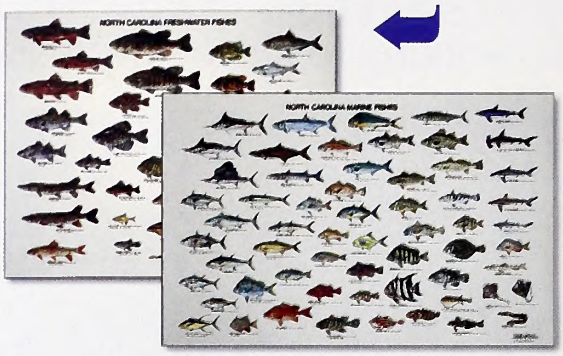
Order "Rivers of North Carolina" today for your own bookshelf, or give it to friends and family members to enjoy. For $10, plus shipping and postage, you'll have a coffee-table edition that's already being hailed as a classic.

Item Code M11 $10

All proceeds from the sale of these products support the development and production of conservation education projects and programs.

N.C. WILD STORE

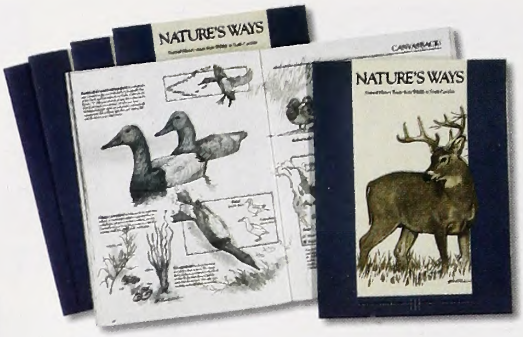
North Carolina's freshwater fish and marine fish are colorfully displayed on individual posters, and feature the art of Duane Raver. Reel yours in today!



Fishes of North Carolina

Set of 2. Freshwater fish poster shows 36 state species (size 28" x 22 1/2"). Marine fish poster shows 60 species (size 35" x 22 1/2") $10.

ITEM CODE **P9**



Nature's Ways Collection

Explore the wonders of the natural world, wildlife species and ecosystems through "Nature's Ways." More than 200 essays from *Wildlife in North Carolina* have been compiled in a beautiful 6-volume paperback set. $27.50.

ITEM CODE **M9**

Also available as a boxed set. $30

ITEM CODE **M10**

Before going on your next outdoor hike or camping trip, be sure you know North Carolina's reptiles.

Reptiles of North Carolina

Set of 4 posters in full color. Each poster decribes the species and denotes which reptiles are on the endangered, protected or special concern list. A set includes: lizards, turtles, and both live-bearing snakes and egg-laying snakes. Posters are sized 22" x 34". $18. ITEM CODE **P10**

Amphibians of North Carolina

The Hylid Frogs. North Carolina's tree frogs, cricket frogs and chorus frogs, belonging to the large family *Hylidae*, are presented in this colorful poster, one of two frog posters in the Amphibians series. 22" x 34". $6.

ITEM CODE **P11**

Amphibians of North Carolina

True Frogs and Toads. The second poster in the Amphibians series showcases true frogs and toads. Vibrant photos combine with informative text to make it a standout in the classroom or at home. 22" x 34". $6.

ITEM CODE **P14**

Waterfowl Decoys of N.C.

Nineteen classic waterfowl decoys from North Carolina's legendary days of waterfowl hunting have been collected for the first time on this framable, high-quality poster. This is the first in a series of "Sporting Heritage" posters. 22" x 34". $10.

ITEM CODE **P12**

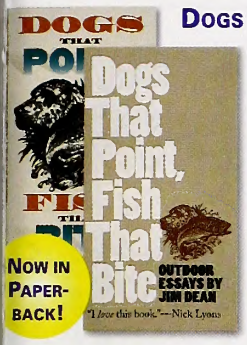
Traditional Trout Flies of the Southern Appalachians

Sixteen traditional trout flies are presented in stunning color detail. Each fly is accompanied by a brief history of its development and use in Appalachian waters as well as the components that make up each hand-tied creation. Second in a series of "Sporting Heritage" posters. 22" x 34". $10. ITEM CODE **P13**

Bird Houses & Feeders: How to Build and Enjoy Them

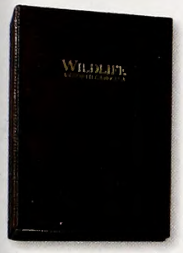
An eight-page illustrated guide to building bird houses and feeders. $2.

ITEM CODE **M6**



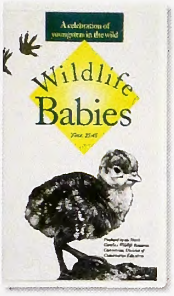
Dogs that Point, Fish that Bite

Here are 50 of the best "Our Natural Heritage" columns written by Jim Dean for *Wildlife in North Carolina* over the past 17 years. Published by the University of North Carolina Press and the N.C. Wildlife Resources Commission. 220 pages. Hardbound $19.95. ITEM CODE **M8**
Paperback $10.95. ITEM CODE **M12**



Magazine Binder

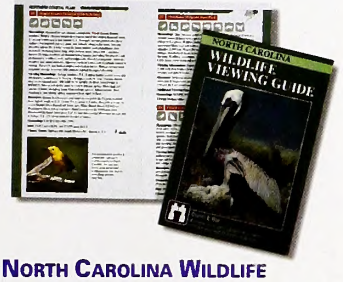
Store 12 issues of *Wildlife in North Carolina* in a sturdy binder. $10.
ITEM CODE **M2**



Wildlife Babies Video

Entertaining 25-minute video version of the classic 1965 Jack Dermid film reveals springtime antics of young wood ducks, black bear, possums, cottontails and others . $20.
ITEM CODE **N9**

Based on Chief Seattle's 1855 speech, the film's focus is on environmental ethics. Accompanied by This Land Is Sacred, this film is a must-see for everyone. It is destined to become a classic.



North Carolina Wildlife Viewing Guide

From Cape Hatteras to the Great Smokies, *North Carolina Wildlife Viewing Guide* will lead you to 90 of the state's premier wildlife viewing locations—and better your chances of seeing wildlife once you get there. $5.95. ITEM CODE **N6**

All Things Are Connected

Video and Activity Guide. $22.
ITEM CODE **W3**

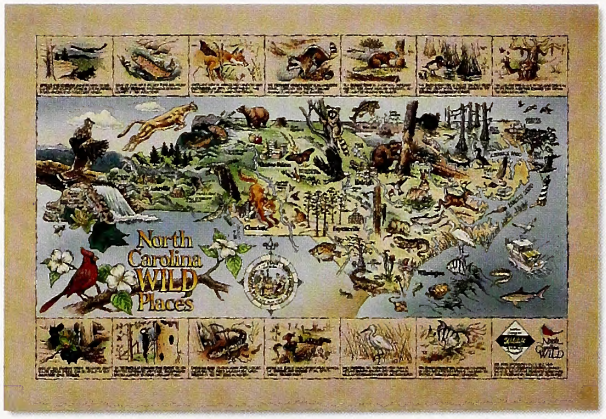
Gardens for Butterflies

Article reprint from *Wildlife in North Carolina* magazine for the gardener who wants to attract some of nature's most colorful creatures. $2. ITEM CODE **M5**

Scouting Correlations

Cub, Boy and Girl Scout requirements are correlated to Project WILD and Aquatic WILD activities. Supplements Scout leaders' planning materials and events. Each $3.
Cub & Boy Scout Correlation. ITEM CODE **E9**
Girl Scout Correlation. ITEM CODE **E10**

North Carolina's wildlife habitats come alive in this 82-page, easy-to-read, soft cover book. With delightful illustrations by Anne Marshall Runyon, N.C. WILD Places covers 13 habitats across the state.



North Carolina WILD Places: A Closer Look

Book and Posters Set. With each book you'll receive two habitat posters (also by Runyon) and a N.C. WILD Places Map poster, featuring the art of Jackie Pittman. $16. ITEM CODE **E6**

North Carolina WILD Places Teacher's Guide

For teachers using *North Carolina WILD Places* in the classroom, these activities and games will heighten student awareness of wildlife habitats. $6.
ITEM CODE **E7**

More terrific items

N.C. WILD STORE

Top-quality, 3-ring binder holds 120 WILDlife Profiles. Custom-made binder comes with a table of contents, tab dividers to organize Profiles by classes, an index and 120 fact sheets.

WILDlife Profiles Binder & WILDlife Profiles Sets 1-12

Binder features clear overlay cover, 1 1/2" capacity and inside literature pockets. See the list of species profiled below. $30. ITEM CODE W17

Set 1. Black bear, raccoon, white-tailed deer, striped skunk, bobwhite quail, wild boar, muskrat, mourning dove, coyote, mallard.

Set 2. Mink, canvasback duck, red fox, wild turkey, beaver, American river otter, Canada goose, bobcat, red wolf, cougar.

Set 3. Humpback whale, black duck, osprey, clapper rail, red-shouldered hawk, cottonmouth, diamondback terrapin, largemouth bass, black crappie, channel bass.

Set 4. Brook trout, garden spider, Tar spiny mussel, wood duck, bullfrog, mayfly, tiger salamander, bog turtle, hellbender, shortnose sturgeon.

Set 5. Cottontail rabbit, gray squirrel, northern flying squirrel, newt, common crow, red-tailed hawk, prothonotary warbler, bluegill, striped bass, Eastern oyster.

Set 6. Opossum, peregrine falcon, Eastern bluebird, American toad, rat snake, Eastern glass lizard, smallmouth bass, brown trout, monarch butterfly, Virginia big-eared bat.

Set 7. Chipmunk, gray fox, bald eagle, loggerhead shrike, common snapping turtle, five-lined skink, bluefish, rainbow trout, grasshopper, horseshoe crab.

Set 8. Appalachian cottontail, manatee, barred owl, turkey vulture, Neuse River waterdog, spring peeper, coral snake, American alligator, American eel, American shad.

Set 9. Southern flying squirrel, fox squirrel, great horned owl, snowy egret, Southern leopard frog, corn snake, Atlantic sturgeon, walleye, luna moth, crayfish.

Set 10. Marsh rabbit, woodchuck, hooded warbler, whippoorwill, green salamander, copperhead, fence lizard, muskellunge, chain pickerel, Scotch bonnet.

Set 11. Atlantic croaker, Southern flounder, summer flounder, spot, king mackerel, Spanish mackerel, sea mullet, weakfish, spotted seatrout, striped mullet.

Set 12. Bay scallop, black sea bass, blue crab, brown shrimp, spiny dogfish and smooth dogfish, gag, hard clam, menhaden, sandbar shark, white perch.

Embroidered Caps

North Carolina WILD Cap. N.C. Wild cardinal on brushed-cotton twill cap with a Velcro® closure. Two-tone cap is tan/forest green. $16.50. ITEM CODE A1

Wildlife in North Carolina Caps. Exclusive designs and magazine logo are featured on three different cap styles. $16.50 each.

- Brook trout on sage-colored, brushed cotton cap with an unstructured front, extended bill, and nubuck suede closure. ITEM CODE A3
- Deer silhouette on Advantage® Camouflage cotton cap with tan suede bill. ITEM CODE A6
- Deer silhouette on blaze orange cap with brown waxcloth bill. ITEM CODE A7

Pisgah Center for Wildlife Education T-shirt

100% cotton natural color tee with design on back and Pisgah logo on front. $14.50.
ITEM CODES:
A8MED (medium)
A8LRG (large)
A8XLG (extra large)
A8XXL (extra extra large)

New: WEE TEES

Just like the adult shirt with Pisgah design, only smaller.
ITEM CODES:
A9XS (extra small; size 2-4) $10.
A9SM (small; size 6-8) $12.50.
A9MD (medium; size 10-12) $12.50
A9LG (large; size 14-16) $12.50.

Wildlife in N.C. T-shirt

WINC magazine logo on front pocket. Tundra swan art on back. White. $14.50. ITEM CODES:
A5MED (medium)
A5LRG (large)
A5XLG (extra large)
A5XXL (extra extra large)

N.C. WILD T-shirt

N.C. WILD logo printed on front and colorful art on back. White. $14.50. ITEM CODES:
A4MED (medium)
A4LRG (large)
A4XLG (extra large)
A4XXL (extra extra large)

WILDLIFE COMMISSION SPOTLIGHT

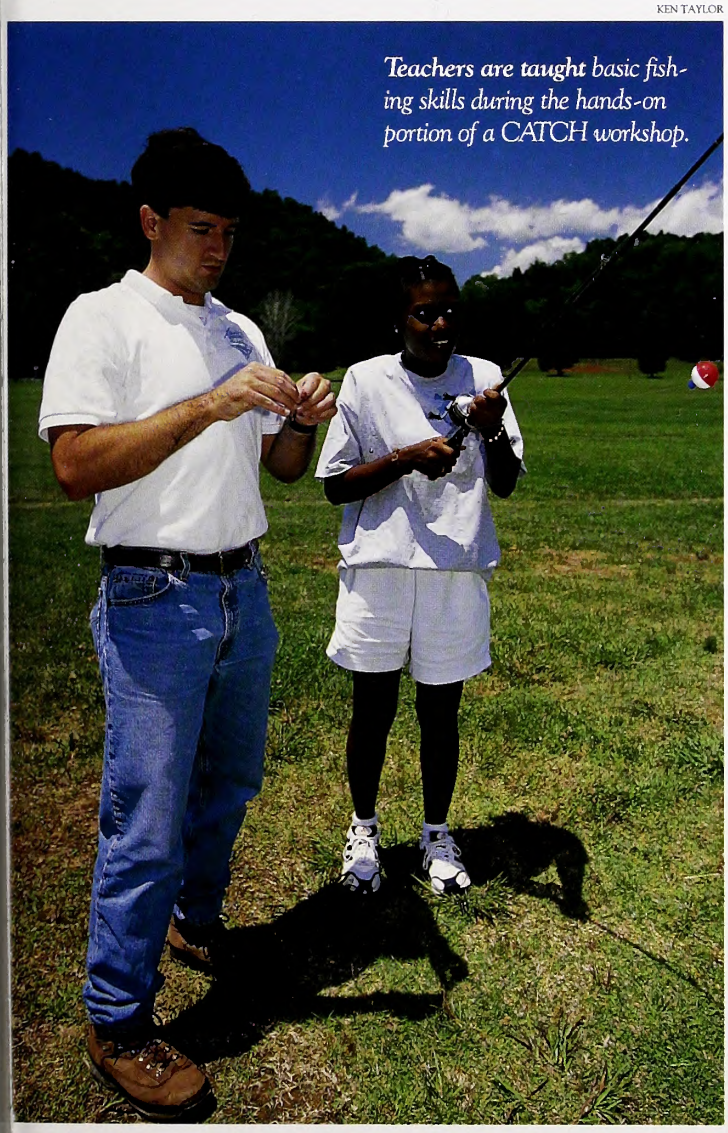
N.C. CATCH

(Caring For Aquatics Through Conservation Habits) is an aquatic resources education program that provides workshop training to adults to enable them to help youths ages 8 to 15 in discovering aquatic environments through learning activities, educational materials, aquatic field trips and fishing experiences.

***The ultimate** goal of CATCH is to teach youths about our state's rich aquatic resources.*

MELISSA McGAW

KEN TAYLOR



***Teachers are taught** basic fishing skills during the hands-on portion of a CATCH workshop.*

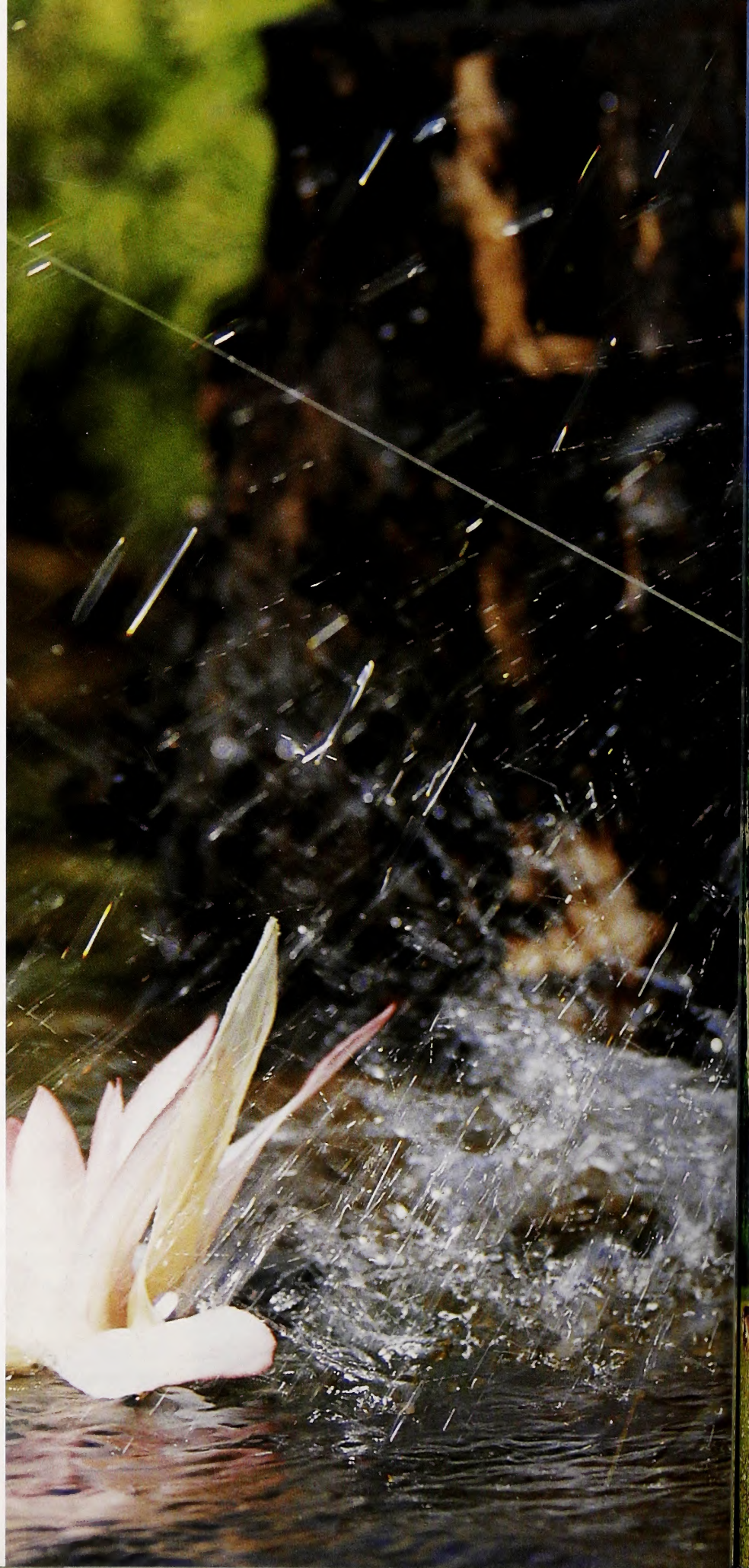
The major components of N.C. CATCH include an Instructor's Guide, Student Handbook, posters, fish identification cards, fish mobiles, rod/reel loan information and a fisheries video. These materials emphasize conservation habits, outdoor ethics, fish and aquatic species information, water safety tips and practical fishing skills. Middle school teachers, scout leaders, recreation therapists, park personnel, camp counselors, fishing and environmental club members, 4-H leaders and other youth leaders will find these materials adaptable and appropriate. N.C. CATCH is interdisciplinary and can be used to meet many middle school competency goals and objectives.

Boy Scouts, Girl Scouts and Scout leaders can participate in N.C. CATCH training and activities at all age levels. Scouts can earn badges, and requirements needed to complete projects for advancement and leaders can earn adult training certification.

To receive the free materials, educators or youth leaders must attend a North Carolina CATCH Instructor Training Workshop. The free workshops are facilitated by Wildlife Commission education specialists and are offered year round. Teachers receive one continuing education credit for attending a 10-hour workshop.

For more information about upcoming workshops across the state, call (919) 733-7123, or check out this web address http://www.wildlife.state.nc.us/ConservationEd/catch/calendar/

Aquatic Resources Education
CATCH
North Carolina Wildlife Resources Commission



Leaping Bass

Lunker bass like this lurk in plenty of farm ponds, giving small-water anglers a decent shot at a trophy. But do you know the secrets to getting the best out of farm ponds? See page 4 for details.

Periodicals postage paid at
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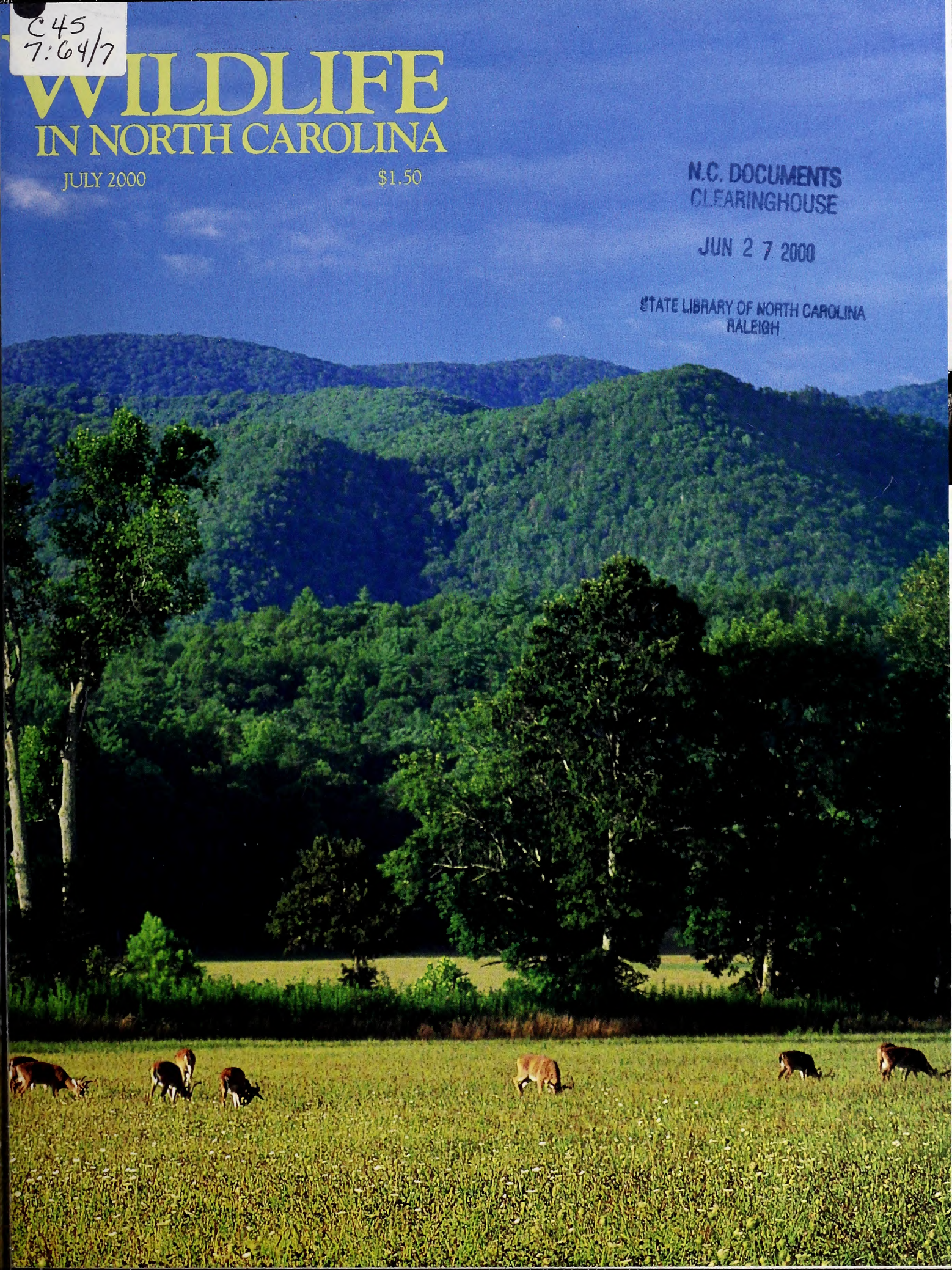

Shifting Sands

by Jim Dean ©2000

Beginning in the late 1940s, my family rented a cottage for two weeks each summer at Long Beach. Those idyllic trips ended when Hurricane Hazel pounded ashore in October 1954, leveling the island. I recall walking on the flat sand and seeing only a spoon sticking out and a few cinder blocks. Several hundred yards behind the island, against the edge of the marsh and scrubby trees, you could see where the overwash had deposited a line of rubble—boards, roofs, pieces of cottages tilted at crazy angles—all that was left of more than 300 summer homes.

JIM DEAN

In 1958 my family visited Bogue Banks, looking for a new place to spend vacations. Salter Path was a quaint fishing village centered around an old wooden store and a church. Net boats sat in every yard under big live oaks. A narrow, potholed blacktop led west 5 miles or so to the Emerald Isle Pier where there were a few trailers and one seedy motel. Just past the pier, the blacktop hooked sharply toward the beach and ran for 2 miles just behind the ocean dunes, then it simply ended. Bogue Pier and the soundside ferry to the mainland came later. There was only one oceanfront cottage along the desolate beach and dunes from the Emerald Isle pier all the way to Bogue Inlet, and not even a paved road marred the dense maritime forest.

North Carolina was in the midst of a severe hurricane cycle, much as it is now, and you could take your pick of oceanfront lots for $3,000. Dad and my grandfather decided to risk some retirement savings, and they purchased lots at the end of the road west of the Emerald Isle Pier where the dunes were highest. Dale Haverstock, an old friend and contractor, bought a third lot alongside for his family and agreed to build all three cottages in 1959.

"For the next 15 years or so, those three cottages sat alone. For us, it was a marvelous window in time."

The cottages weren't expensive (even by 1960 standards), but they were built with memories of Hazel still fresh in mind. They sat low behind the dunes with airfoil-designed, diamond-peaked roofs and no overhangs to catch the wind. Creosoted telephone poles sunk 20 feet supported the main living space. Walls, floors and ceilings were stout tongue-and-groove cypress. Lightly tacked siding enclosed the pilings and garage on the lower level. In the event of an overwash, the siding would be easily carried away, allowing water to run under the cottage.

The structures were quickly tested in 1960 when Hurricane Donna passed over the island with 135 mile-per-hour winds. Several overwashes cut through the island, but our high dunes paid off. We lost only a few shingles and a walkway.

For the next 15 years or so, those three cottages sat alone. For us, it was a marvelous window in time. Mom and my brothers, Graham and John, walked the lonely beaches hunting the plentiful shells. I especially enjoyed exploring remote dunes and maritime forest.

Scattered cottages began to appear, but construction didn't really take off until the late 1970s and '80s, especially after the ferry was replaced by a bridge. Even so, that part of Emerald Isle has remained a family beach devoid of honky-tonk development. In the years following Donna, the dunes in front of our cottage rebuilt naturally and are actually higher now than ever.

In a reflective mood one afternoon this past spring, I drove from Salter Path to Bogue Inlet just looking. The years have seen an amazing transformation. There are cottages on nearly every lot from ocean to soundside, including the vast maritime forest and beaches west of Bogue Pier. Some older cottages are even being replaced by huge, new ones at costs that are nearly beyond imagination. Nor was the irony lost on me that our three sentinel cottages had contributed to all these changes by their improbable endurance for 40 years.

I don't think my family ever thought our cottages would last so long, or that so many others would follow. We have been privileged and fortunate, especially since we could never afford to buy and build there now. And while many view these changes with mixed feelings, the development of private beaches virtually everywhere may have been inevitable despite the risk.

If nothing else, North Carolina was wise to have placed so much of our Outer Banks in shared public ownership, especially the national seashores. There, all of us can, without risk, enjoy the natural dynamics of wind, sea and sand.

Contents

Wildlife in North Carolina

Wildlife in North Carolina is the official educational publication of the North Carolina Wildlife Resources Commission. It is dedicated to the sound conservation of North Carolina's wildlife and other interrelated natural resources and also to the environment we share with them.

July 2000 *Volume 64, Number 7*

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A small boat off North Carolina's coast must whistle past the Graveyard of the Atlantic to pursue some of the East Coast's hottest angling.

8 **In Search of Smoky Mountains Fungi**
written by Phillip Manning ©2000
photographed by William S. Lea ©2000
A unique survey of fungi in the Great Smoky Mountains National Park represents an extraordinary step in conserving the park's biodiversity.

14 **Nikwasi—Sacred Fire** *written by Burt Kornegay* ©2000
illustrated by David Williams ©2000
Rising out of the commercial bustle of downtown Franklin, a tall, grassy mound is all that remains of a ceremonial site sacred to the Cherokee.

18 **Clammers Delight** *written by Rodney Foushee*
photographed by Lawrence S. Earley
Few things compare to the simple pleasure of clamming. In the solitude of a salt marsh, it's easy to find yourself.

24 **Mr. In-Between** *written and photographed by Soc Clay* ©2000
It loves to prowl rocky and shale-covered lake bottoms in search of crawfish, but the spotted bass is just as likely to be found chasing a school of shad.

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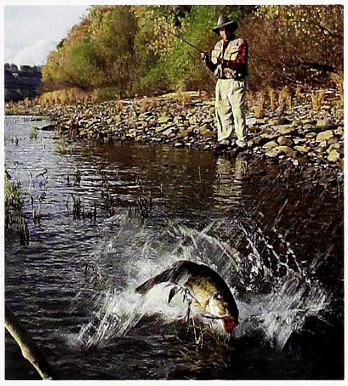

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Cover *Whitetails are one of thousands of species that make the Great Smoky Mountains National Park a mecca for biodiversity. Photograph by William S. Lea.* ©2000

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Wildlife in North Carolina (ISSN 0043-549X) is published monthly by the North Carolina Wildlife Resources Commission, 512 N. Salisbury St., Raleigh, N.C. 27604-1188. Periodicals postage paid at Raleigh, N.C. and additional mailing offices. Subscription rates: one year $7.50, three years $20, lifetime $100. All foreign subscriptions are $23.50 per year. For subscriptions from foreign countries, payment **only** by U S Postal Service money order or cashier's check drawn on a U.S. bank. All orders must be prepaid. Please allow 6 to 8 weeks delivery on new subscriptions and address changes. **POSTMASTER:** Send address changes to Circulation Manager, 1711 Mail Service Center, Raleigh, N.C. 27699-1711. Address all correspondence regarding subscriptions to Circulation Manager. If you have a problem with your subscription, dial (919) 662-4377. Articles in *Wildlife in North Carolina* may represent the personal views of authors, and do not imply endorsement by the North Carolina Wildlife Resources Commission. *Wildlife in North Carolina* is available on audio cassette as a courtesy of volunteer services of the Department of Cultural Resources, Library for the Blind and Physically Handicapped, Raleigh, N.C., (919) 733-4376. **The N.C. Wildlife Resources Commission is an equal opportunity agency.**

Deciphering Mimicry

written by Jeff Beane ©2000
illustrated by David Williams

Why do so many creatures resemble one another? That question has intrigued naturalists for centuries. Mimicry, the tendency of one organism to closely resemble another, is common in nature, but our attempts to interpret it sometimes come up short, or are even downright wrong. That's because mimicry is an extremely complex evolutionary phenomenon that can easily fool the most careful wildlife biologist.

Some mimicry involves basic camouflage, or crypsis. The advantage in a katydid mimicking a leaf, or a walkingstick resembling a twig, is obvious—creatures resembling inedible objects may be overlooked by predators.

But what about different animal or plant species that resemble each other? Poisonous or bad-tasting organisms are often boldly colored or patterned. Such aposematic coloration serves as a warning to predators capable of learning from a bad experience to avoid them thereafter. An edible species that resembles an inedible one is an example of Batesian mimicry, named for the English naturalist Henry Bates. For Batesian mimicry to succeed, both species must coexist, and the noxious model must be more common than its mimic.

Another type of mimicry, termed Müllerian mimicry (after the German zoologist Fritz Müller), involves two or more noxious species that look similar. Müllerian mimics benefit from mutual resemblance because predators encountering any one will more quickly learn to avoid them all.

But things aren't always that simple. In many biology textbooks, the case of the monarch and viceroy—two unrelated but strikingly similar butterflies—is cited as classic Batesian mimicry. Monarch caterpillars eat milkweed and retain its toxins, rendering adults unpalatable. The supposedly tasty viceroy was long considered a Batesian mimic of the monarch. But recent studies have revealed that viceroys also taste bad. Some predators also eat monarchs with impunity. Even more interestingly, some monarch populations feed on milkweed species that leave them relatively palatable, while others eat nastier milkweeds. The tastier monarchs benefit by resembling the noxious members of their own species, a phenomenon known as automimicry. It now appears that monarch-viceroy mimicry is actually more Müllerian than Batesian.

Another deception involves the coral snake and its alleged mimics, the nonvenomous scarlet kingsnake and scarlet snake. This theory also has holes—coral snakes (at least in some places, including North Carolina) are rare, secretive and so venomous that few predators, if bitten, would survive to learn from the experience. Their "mimics" are nocturnal and probably seldom encountered by visually oriented predators. They also occur in some places where coral snakes do not. But if we expand our view to include the tropics, we see a bewildering assortment of red-, yellow- and black-ringed snakes, including some extremely venomous, some only mildly venomous and some completely harmless species. Their shared color pattern is too common to be coincidental. Perhaps it's merely good camouflage against predators who don't see colors the way we do, or perhaps coral snakes taste bad. But some scientists believe that certain mildly venomous tricolored snakes are the actual models—from those a predator might suffer a painful but non-fatal bite and survive much the wiser. If so, the deadliest coral snakes may actually be mimics and not models—both they and the harmless species benefiting from their resemblance to the mildly venomous snakes. This situation, where a mimic is more noxious than its model, is known as Mertensian mimicry, after the German zoologist Robert Mertens.

Yet another form mimicry may take is aggressive mimicry. Here a predator resembles a nonpredator in order to deceive its prey. This occurs in certain fireflies of the genus *Photuris*, the females of which mimic the flash patterns of other species in order to lure in amorous males of those species for an easy meal.

Still another variation on mimicry is vocal mimicry, practiced by some birds, including mockingbirds, thrashers, catbirds, starlings, crows and jays. This might at first appear to cause more confusion than advantage, but imitating the calls of other species could help a mockingbird keep those species out of its territory.

Mimicry is truly a fascinating and complex topic. Mimics not only fool their predators and prey, they often deceive naturalists in search of easy explanations!

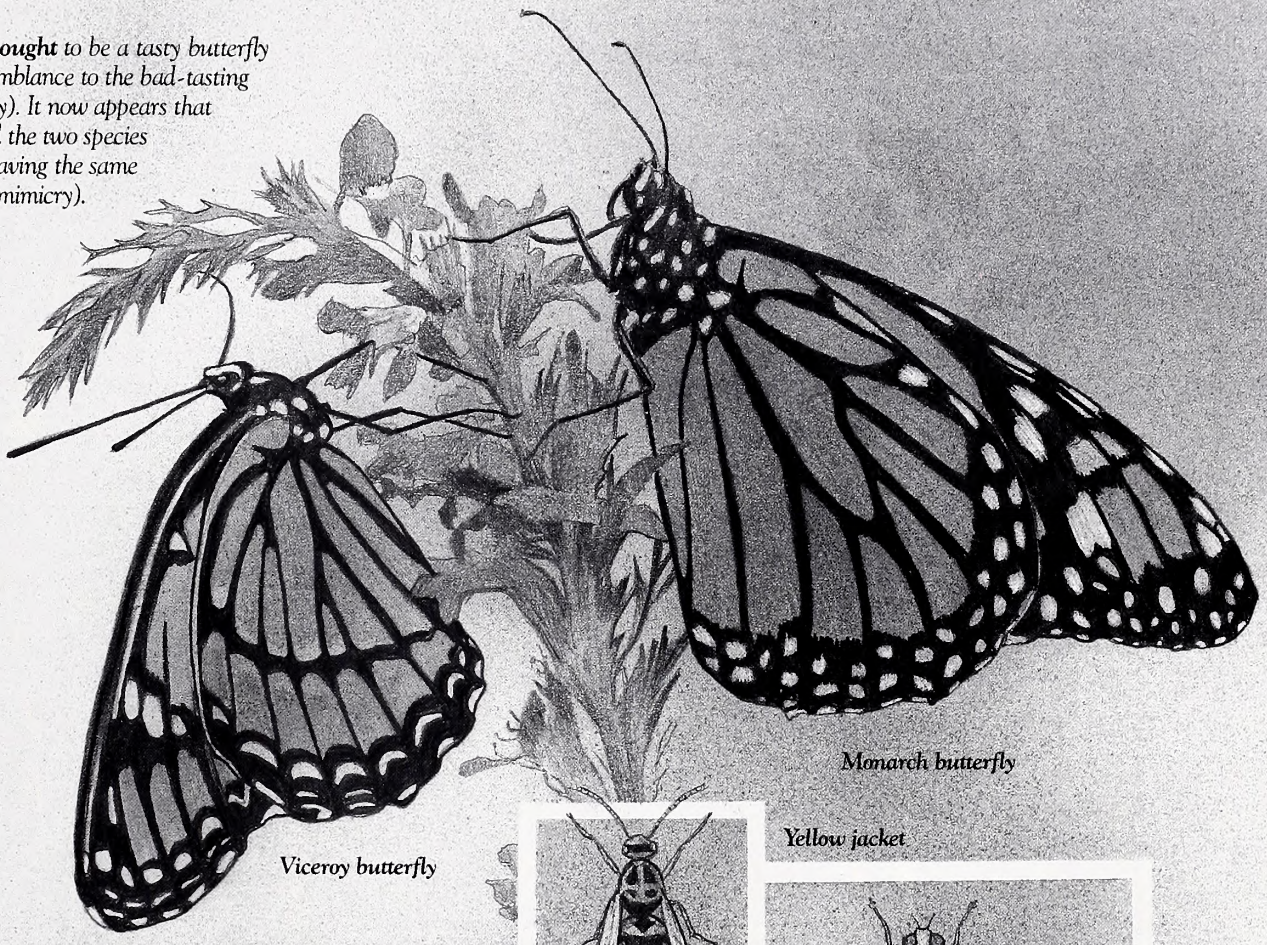
Other Reading:

- Wolfgang Wickler, *Mimicry in Plants and Animals* (McGraw-Hill Book Co., 1968).
- Denis Owen, *Camouflage and Mimicry* (University of Chicago Press, 1980).
- "Mimicry: Sheep in Wolves' Clothing," by Graeme D. Ruxton, *Nature* (Aug. 27, 1998, pp. 833-834).
- "The Viceroy Butterfly is not a Batesian Mimic," by David B. Ritland and Lincoln P. Brower, *Nature* (1991, no. 350, pp. 497-498).
- "Coral Snake Mimicry: Does it Occur?", by Harry W. Green and Roy W. McDiarmid, *Science* (1981, no. 213, pp. 1207-1212).

Surfing the Web

- For more on the monarch-viceroy scenario, visit this website.
  Address: http://www.chebucto.ns.ca/Environment/NHR/monarch.html
- For general information on the different types of mimicry, check these websites.
  Address: http://fig.cox.miami.edu/Faculty/Tom/bil160/18_mimicry.html
  Address: http://library.advanced.org/27968/mimicry.shtml
  Address: http://www.best.com/~dlindsay/creation/mimicry.html
  Address: http://www.cc.ndsu.nodak.edu/instruct/brewer/mimicry.htm

The viceroy was once thought *to be a tasty butterfly that benefited from its resemblance to the bad-tasting monarch (Batesian mimicry). It now appears that viceroys also taste bad, and the two species probably both benefit by having the same warning colors (Müllerian mimicry).*

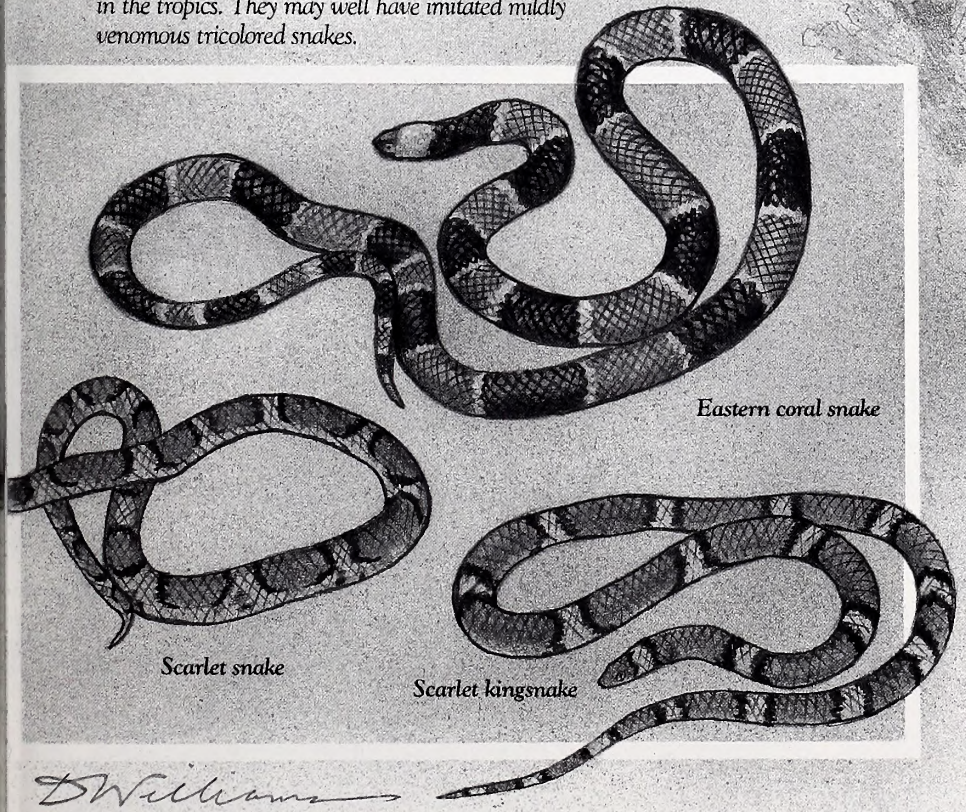


Monarch butterfly

Viceroy butterfly

Yellow jacket

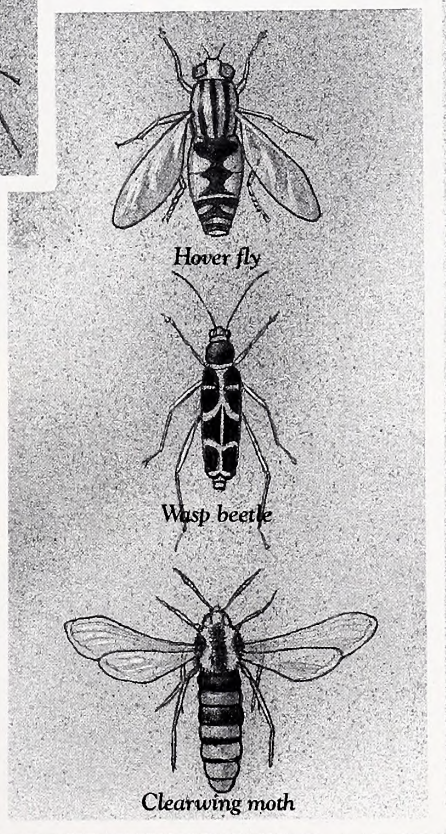
The scarlet kingsnake *and scarlet snake were long considered mimics of the venomous coral snake. Instead, all three may be carryovers from a more complex relationship that originated in the tropics. They may well have imitated mildly venomous tricolored snakes.*



Eastern coral snake

Scarlet snake

Scarlet kingsnake



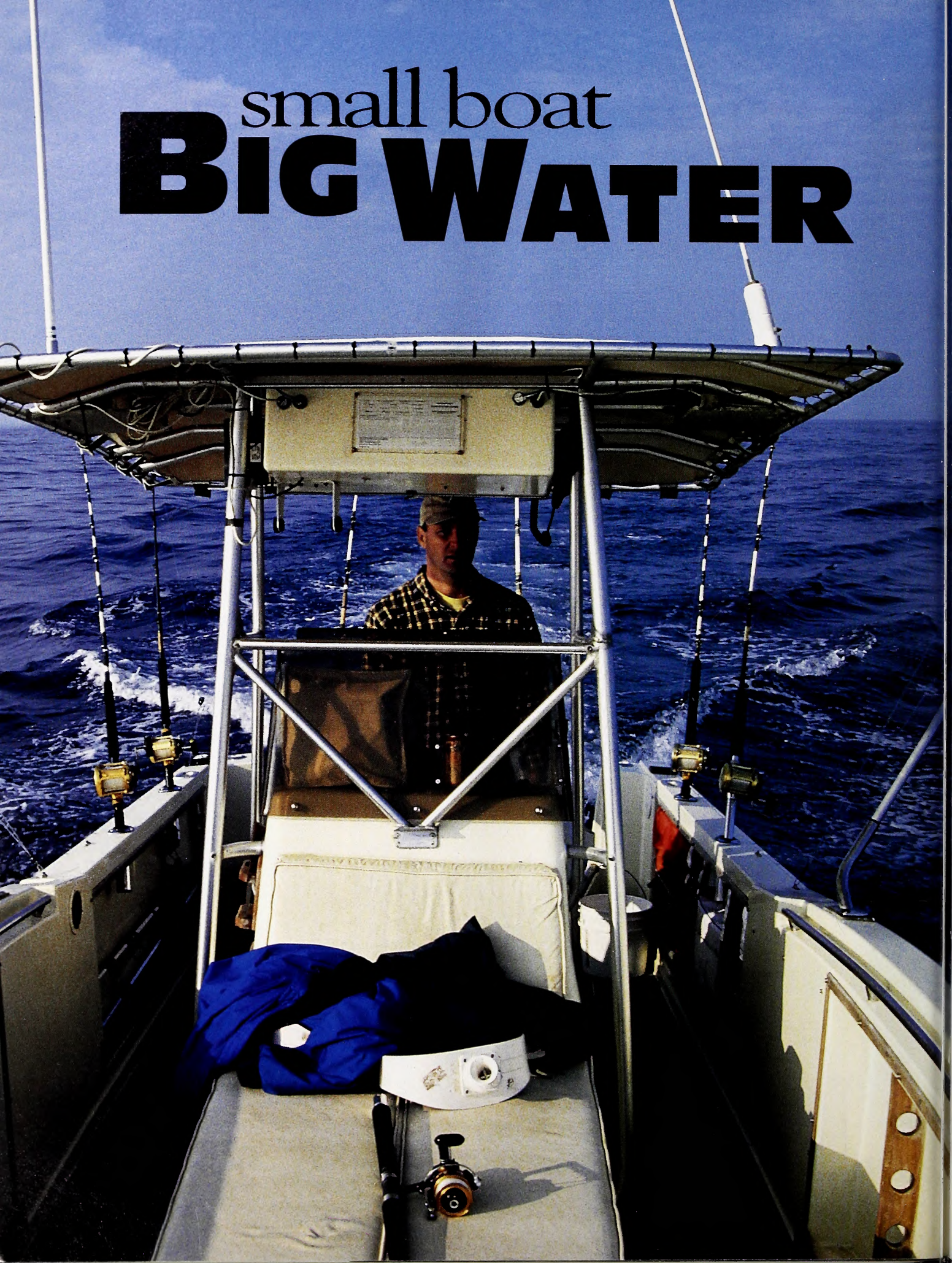
Hover fly

Wasp beetle

Clearwing moth

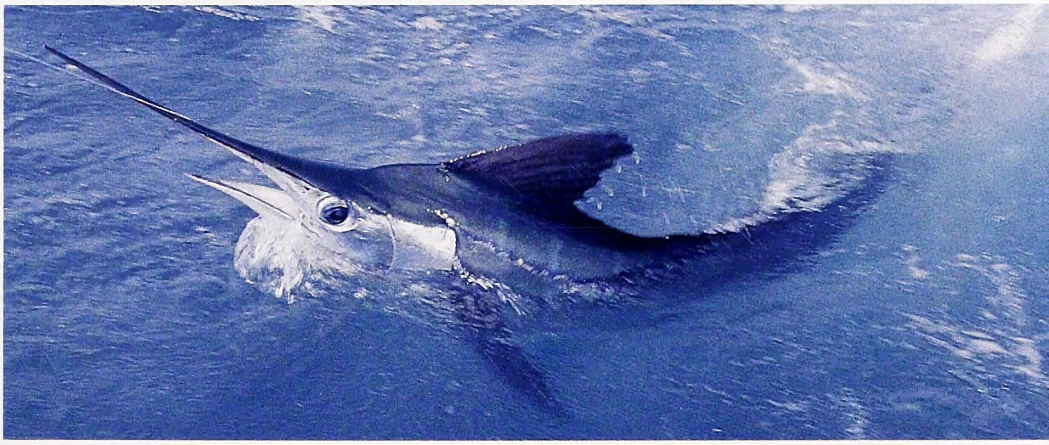
Many harmless insects, *including certain flies, beetles and moths, fool predators by resembling bees or wasps. Such species are known as Batesian mimics.*

small boat BIG WATER



A small boat off North Carolina's coast must whistle past the Graveyard of the Atlantic to pursue some of the East Coast's hottest angling.

written by Chris Powell



ED WILKERSON

"Release the drag, release the drag!" I practically screamed. "I can't," cried my friend, Steve, through clenched teeth, as he white-knuckled the rod, veins bulging from his forearms.

Whatever had hit our ballyhoo was a powerful fish, and it wanted line—lots of it. Unfortunately, we had no more to give. In an instant, half the 9/0 Penn Senator's spool had been stripped, revealing a point where the 80-pound monofilament was wrapped over itself. It meant that no more mono could be paid out. And that was a problem.

The rod bowed again, hard, and Steve could only stagger a few steps toward the stern of the boat to try and ease the tension.

"You've got to get some line back," I urged, holding onto Steve and the rod to prevent either from being snatched from the boat. "Pump the rod and start reeling, or this fish is gone."

For the next half-hour, Steve would manage a few cranks, and the fish would take it right back to zero. The monster would make a run 100 feet below us, and Dad would wheel our 23-foot boat around, trying to stay directly over top. Sometimes we'd steer circles; other times we were off to the races, as the fish continued to dictate terms.

When you troll a bait through the electric blue waters of the Gulf Stream, there is no telling what might jump on it. One minute you're bored out of your mind, the next all hell has broken loose. This time, we found ourselves in a heavyweight title fight, and the four of us—my dad, Irving Powell; friends Steve Ellis and Bobby Papp; and I—were clearly the underdog challengers.

After about a half-hour, a tired Steve had managed to retrieve enough line so that he was trading 30- and 40-foot segments instead of turns on the reel. A round of cranking would be immediately followed by the heartbreaking sound of the drag zinging out mono.

"I think I hooked a school bus," groaned Steve, as he lowered his head over the rod and reel, determined to bring the fish in solo. We guessed it to be a big tuna, or just possibly a larger blue marlin that didn't feel like jumping. Each time it started to slowly come up, we'd think it was surely beat, only to watch helplessly as it peeled off more line. And Steve would start climbing back up the hill.

Almost an hour into the fight, we got our first look at the fish—a gorgeous blue-and-yellow tuna. It no longer had the strength to swim a straight course, so it made slow circles beneath us. To keep the line away from the motor, Dad kept the boat in gear, constantly swinging the stern of the boat away. For a full 15 minutes, we did this dance like two tired prizefighters hugging in the middle of the ring.

The job of gaffing fell to Bobby and me, and I had never felt more pressure to land a fish. To lose this one at the boat would have been devastating. I had never gaffed one this size, but I knew it was dangerous. When retrieving the leader by hand, loose coils fall around the deck, and even the pros sometimes get entangled and dragged overboard. As a precaution, we kept a knife handy, and Bobby tied a short rope from my waist to a cleat. If I went in, I could be hauled back up.

The fish finally came to the top, and time seemed to move in freeze frames as I pulled the leader toward the boat. I remember Bobby, standing at my side, sinking the gaff on the first try. My next memory is of myself—supercharged with adrenaline—lifting the 150-pound bigeye over the side as if it weighed nothing.

I've discovered in life that opportunities for glorious moments become fewer and fewer as we grow older. We don't score as many touchdowns; we don't hit as many home runs or reach match point as often. But when that fish landed on the deck, it felt as if we had won the Super Bowl, the World Series and Wimbledon—all at once. Just being 35 miles off North Carolina's coast in a 23-foot boat is accomplishment enough. But when part-timers lock horns with a big trophy fish and come out on top, that's a memory worthy of a special bookmark.

***Every summer, small** boats venture off the state's coast in pursuit of some of the best saltwater angling on the East Coast. With the right know-how, small boat anglers may hook a prize game fish such as a white marlin (above).*

Going Offshore?

If you want to take your boat to the Gulf Stream, understand that on the open ocean Murphy's Law is multiplied by 10. Thirty miles offshore is a long ways, and anything can and will happen. Here are a few of the top concerns when planning a safe trip.

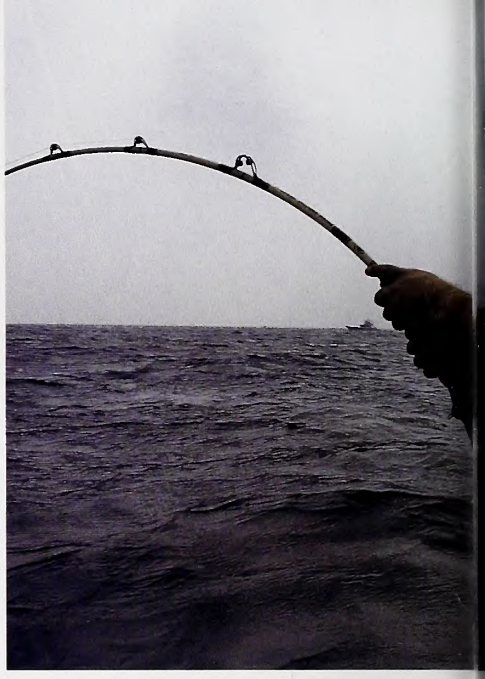
- Before your first voyage, tag along with someone who's been fishing offshore a while and can point out the pitfalls. Also, the Coast Guard offers courses for obtaining captain's licenses, which extensively cover all aspects of navigation and boating safety.
- Unless you have a 30-foot boat or larger, don't go if offshore forecasts call for seas greater than 3 feet or winds more than 10 to 15 knots.
- Make sure your radio and Coast Guard-approved safety equipment are in good condition, and take enough water and food for two days.
- You will need a minimum of 100 gallons of fuel, and plan your consumption so you return with at least a quarter tank of gasoline, for a margin of error.
- If your engine so much as hiccups, have your mechanic give it a thorough inspection.
- Tell someone where you plan to go and when you plan to return.

For a number of years now, this group has gotten together at least once every summer for a trip to the Gulf Stream. Sometimes we trailer the boat to Cape Hatteras, but mostly we go out of Oregon Inlet, making a beeline for a spot 35 miles southeast known as "The Point." Taking my two buddies is a tradition partly born out of necessity. Fishing the Gulf Stream in a small boat is never a relaxing day afloat. It's serious business. Bobby and Steve understand, knowing that it's really not a matter of *if* but *when* something will go wrong. Our engine could break down; we might hit a floating object; an unexpected squall might develop; or we could misjudge Oregon Inlet. Just to name a few.

But that's also why we love to do it. Part of the challenge of going is coming back, and we take every precaution to make sure that happens. Each of our trips actually begins a week in advance, as we all start monitoring and debating the offshore forecasts. If there's any chance of seas greater than 3 feet, we don't go. If it looks like we might be on, Dad gives the boat a thorough inspection, topping off her 100-gallon tank, pampering the motor, testing the VHF radio and making sure all safety equipment is in order. As a redundancy measure, we rely on Loran (long-range navigation) as well as a hand-held GPS (Global Positioning System) unit to navigate. Loran is a navigational system that relies on radio towers that shoot intersecting radio signals for boats to plot courses. GPS provides more precise navigation via a satellite signal. But either of these devices can fail for a variety of reasons, so we also have the old standby, the magnetic compass.

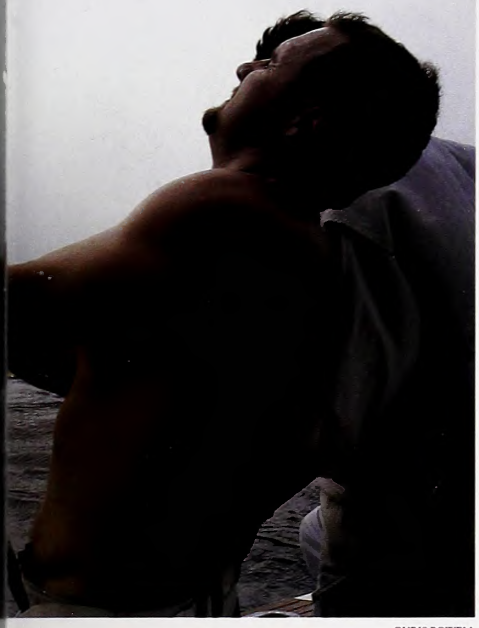
If we're not sure where the bite is, I'll use a computer the day before to access satellite images of offshore surface water temperatures. (These images are available through the National Oceanic and Atmospheric Administration's web site.) When water temperatures rise during the summer, cool spots are the key. Sometimes a temperature variance of only a few degrees is the difference between an excellent day and a waste of gas and time.

We try to leave the dock between 4:30 and 5 a.m. Right out of the gate, it's a gut check. Through the pitch dark morning we thread the channel, bouncing spotlight beams off buoy markers. One wrong turn and we're aground for the next two hours. But the early run is worth it. Because we use a smaller boat, we're always looking for an edge. A quick start means we can sometimes fish an hour longer during the best part of the morning. It's a game, and over the years we have become better at playing it. We've always caught our share of yellowfin tuna and dolphin. And on our last three trips, we've recorded two citations—the bigeye and one released white marlin.



An offshore fishing vessel is never truly anointed until a marlin—king of all big gamefish—is caught and released. But raising (attracting) a billfish isn't an easy feat for smaller boats like ours. The underwater throbbing created by charter boats' large, inboard diesel engines raise fish better than outboards. I don't know of any documented research to explain this fact, but charterboat captains swear by it. Some even believe different brands of diesel engines raise fish better than others do. And I've heard of props being intentionally dinged with a hammer to create a varying cadence under water. I would think all this to be just fishermen's tales if I hadn't seen several occa-

A small boat, a group of friends and a citation bigeye tuna provide the ideal ingredients for adventure on the high seas. From left are: Irving Powell, Bobby Papp, Steve Ellis and Chris Powell.



CHRIS POWELL

Steve Ellis wearily *leans back against the rod, trying to regain line from a brute of a bigeye tuna. But as evident in the bow of the rod, the fish doesn't plan on giving an inch.*

sions when every charter boat around us was hooked up while our lines went untouched.

The day we caught the marlin was like that. The whole charter fleet seemed to have fish on for the first two hours, while we could only watch from the bench. Different trolling speeds, smaller ballyhoos, lighter leaders—we tried them all but nothing seemed to work. And just when we had almost lost hope—*Ziiiiiiiiiiiiiiiing*. A big white marlin (we estimated 60 to 75 pounds) smoked one of our starboard reels. Usually when we offer Dad a bending rod, he passes so that a guest can have the fun. This time, however, we didn't have to ask twice. The fish put on a spectacular display of acrobatics as it tail-walked 75 yards out, exploding from the water. After a 15-minute performance, the marlin wore itself out, and we snapped pictures of it at the side of the boat as it wearily surfaced one last time, then spit the hook and swam away. Jubilation!

Another disadvantage of smaller boats is the number of baits that can be trolled at one time. Larger vessels use their outriggers to troll seven baits, and occasionally more, in very wide spreads. Without outriggers, however, we're lucky to get five lines overboard and in a much tighter formation. Because we can't cover as much water, we use a couple of tactics to get our baits noticed.

We believe in creating as much commotion as possible in our spread of baits. Sometimes we'll use as many as two birds, which are hookless blocks of wood with wings that churn the water on the surface like propellers. The bird is attached to the leader 20 feet ahead of the bait and simulates an erratic baitfish fleeing a predator. Dolphin and wahoo can't resist. We will also deploy either of two teasers, a big Hawaiian Eye or a dolphin decoy, in the prop wash directly behind the boat. Dad's latest gimmick—and probably the deadliest—is the use of a spreader bar. This contraption is nothing more than a thin metal rod bent into a slight V, with strings of rubber squids attached to each side. The last bait is a hooked ballyhoo with a skirt. The fake school dives through swells, surfaces and even scatters like startled baitfish. In my opinion, spreader bars attract more fish than they catch. But that doesn't make them any less valuable. Fish first notice the spreader and then zero in on another line's ballyhoo, which appears to be a lone straggler.

Another trick we use is to start the morning by pulling a few of our ballyhoos behind 50-pound leaders instead of our usual 120-pound leaders. Calm seas allow fish to get a sharp look at your presentation, so we drag a few baits with the lightest leaders possible. I'd rather have an initial hit break off and know we're in fish than troll heavy leaders that might be turning everything away. If the fish don't appear leader-shy, I'll quickly switch to heavier stuff.

By using these tricks of the trade, we at least partly compensate for some of our smaller boat's shortcomings in big water. Nothing ever really takes the place of 20 extra feet on the bow, a flying bridge and twin diesels. Still, that doesn't mean small boats can't enjoy success at the same fishing grounds. And some negatives can become positives. Smaller boats use considerably less fuel. A day offshore can be done for about $150 in our boat, while the going rate for a charter trip is $1,000. Also, on a really calm day, a decent-size outboard can get a small boat to the Gulf Stream and home faster than many twin-screw boats. Finally, taking a smaller boat offshore means you, not a captain or mate, get to do the strategizing, the rigging, the gaffing, all of it. You are the difference between success and failure. That's the best advantage of all. ⊠

CHRIS POWELL

in search of SMOKY MOUNTAINS **fungi**

A unique survey of fungi in the Great Smoky Mountains National Park represents an extraordinary step in conserving the park's biodiversity.

written by Phillip Manning ©2000
photographed by
William S. Lea ©2000

A *cinnamon-colored* Tricholomopsis formosa *grows out of the decaying trunk of a dead tree. This wood decay organism, or saprophyte, aids in the decomposition process, enabling nutrients in the wood to be recycled.*

We rendezvous at a gas station a few miles from Maggie Valley, near the Cataloochee entrance to the Great Smoky Mountains National Park. Cars with New Jersey, New York, Pennsylvania and District of Columbia license plates join locals from North and South Carolina. The gathering resembles a family reunion, with a lot of hugging and "I haven't seen you since...." I feel like the red-headed stepchild because I am the only person wearing a shirt without a mushroom on it. I am also the only one of the 18 people gathered here who is not a professional or amateur mycologist.

The leader is Rod Tulloss, a tall man from Roosevelt, New Jersey, with thinning hair and a walrus mustache. He wears jeans and an "Arkansas Mycological Society" sweatshirt. Rod has a Ph.D. in mathematics from the University of California at Berkeley, but since he retired from Bell Labs, he has parlayed his interest in mushrooms into a full-time avocation. And though his appearance is casual, his purpose is serious. Rod and his group are taking the first step in a mammoth project to identify and map the ranges of every single species in the Smokies. Today, the focus is mushrooms.

We drive into the park and begin the trek up Rough Fork Trail to our collection area. The spring air is cool, and the gurgle of Rough Fork Creek accompanies us as we walk. Each person carries a wicker basket filled with sheets of wax paper to wrap and store the samples they collect. The members of the group, many of whom are from the Asheville Mushroom Club, chat animatedly as we walk, recalling excursions into other woods at other times. Twenty minutes later, we reach the collection site.

Rod lays out a transect, a 50-meter-long, 8-meter-wide rectangle marked by red plastic tape. He assigns eight people to each end of the rectangle and instructs them to walk toward the center and collect every fungus in a 1-meter-wide swath. Seconds later, the transect is littered with prone or squatting bodies.

"Look at this," says Rod. He is on his belly examining a large mushroom with a spindly stalk and a yellow cap. "*Amanita muscaria*

L. F. GRAND

variety *formosa,* also known as the beautiful fly killer. Amanitas are my specialty. This is a great way to start the day!"

Indeed, a spectacular amanita is a great way for a mycologist to start the day. For mushroom eaters, it isn't so hot. Many amanitas, including the one that excited Rod, are poisonous. The death cap and destroying angel are amanita species that are often fatal when eaten. Nevertheless, like all mushrooms, they are crucial to the health of a forest.

Mushrooms are the fruiting bodies of fungi, but it takes miles of buried microscopic filaments to support a mushroom. These filaments, called hyphae, do the heavy lifting in a forest. One group of fungi, the saprophytes, helps decompose dead wood and turn it into dirt. Without these fungi, plant debris could accumulate and suffocate the living forest. A second group, mycorrhizal fungi, helps tree roots absorb nutrients. Without fungi, the lush forests of the Smokies would change dramatically and might even vanish. Fortunately, there are plenty of fungi.

Susan Mitchell, an enthusiastic amateur mycologist from Pisgah Forest, spots an edible bolete, *Suillus granulatus.* She scrapes the rich black soil from the base of the mushroom with her fingers and digs it out with a Swiss Army pocket knife. Soon, the air is filled with excited yells and Latin words as the other members of the group call out their finds. *"Hygrophorus." "Tricholomopsis." "Ascomycete."* I remember a bumper sticker on one of the cars at the parking lot: "Mycologists have more fungi." And for this group, fun and fungi do seem to go together.

PHILLIP MANNING

Early in the day, *a group of volunteer collectors (right) hikes up the Rough Fork Trail in the Great Smoky Mountains National Park to look for fungi. One of the striking fungi species found in the park (above) is* Clavulina amethystina, *a brilliantly colored coral fungus found in mountain forests of mixed hardwoods, mostly oak. On the facing page, the* Amanita muscaria *var.* formosa *is one of five different varieties of* Amanita muscaria *in the state, ranging from red to white. Though deadly poisonous, this mushroom is the fruiting body of a beneficial mycorrhizal fungus that infects the roots of pine and oak trees.*

But everyone knows they are beginning a serious mission: the identification of every fungus in the Great Smoky Mountains National Park. In the next year or two, 20 other groups will begin combing the park to identify and map the ranges of other families of organisms, from viruses to mammals. When the project is finished 10 or 15 years from now, park managers hope to have a comprehensive assessment of the park's biodiversity, a list and range map of every species in the park. It is a huge project, one never undertaken on such a scale before. And in addition to the scientific information it will generate, biologists believe it will improve the way the park is managed.

The idea of identifying every species in a natural area started with Dan Janzen, a tropical ecologist from the University of Pennsylvania. He proposed the project in 1993 for the Guanacaste Conservation Area in Costa Rica. Janzen called it the All-Taxa Biodiversity Inventory (ATBI), but the effort died when the Costa Rican government diverted funding to other projects that it deemed more practical. John Pickering, an entomologist at the University of Georgia, who had worked in Costa Rica with Janzen, revived the idea in 1997. And because the Smokies are species rich and centrally located, the park was selected as the new location.

Most ecologists love the idea of an ATBI. After all, ecology is the study of how organisms interact with each other and their environment in an ecosystem. And how can you understand an ecosystem if you don't know what organisms live in it?

E.O. Wilson, the respected Harvard biologist, says that the loss of biodiversity is a major ecological threat to our planet. According to Wilson, we are losing biodiversity because species are becoming extinct at unusually high rates as natural areas are cleared and developed or converted to agriculture. Some scientists believe that we are entering into a great spasm of extinctions, similar to the one that wiped out the dinosaurs 65 million years ago. And that could be bad news.

Think of an ecosystem as a fishing net. Tear the net in one or two places and you can still catch fish. But if the net is torn in too many places, it becomes useless. Similarly, too many missing species can collapse an ecosystem, and we humans depend on ecosystems—to produce the oxygen we breathe, to cleanse the water we drink. Consequently, preserving biodiversity is a critically important goal.

Professor Wilson believes that to preserve biodiversity, we must understand it, and the first step toward understanding it is to survey the world's flora and fauna. And here in the Great Smoky Mountains National Park, 17 mycologists are taking a step toward that goal.

Of course, as they go about the job of collecting samples, none of them is thinking about saving the world's biodiversity. These folks are interested in fungi. Nonetheless, they believe that what they're doing is worthwhile.

Anathea Brooks, a dark-haired woman in a spiffy khaki outfit who works for the World Bank in Washington, D.C., points out a fuzzy white growth on a decaying branch buried in the forest duff. She can't identify it but carefully wraps it in wax paper and adds it to the samples in her basket.

"They found a fungus in Africa recently," she says, "that may allow diabetics to take insulin orally. Just think about it. All those shots—saved by a fungus that no one even knew existed. Fungi are also used to make bread and cheese, not to mention my favorite—wine. There's no telling what we might find here that could benefit mankind. And it's fun, too."

In fact, it does look like fun. In their eagerness to find fungi, the members of the group ignore Rod's instructions to search a 1-meter-wide corridor. They mill about all over the transect, searching for mushrooms under every stone and stick. In an hour or so, their work is done. Supposedly, every fungus in the transect has been collected, wrapped, and stored in someone's basket. Most members then begin to search for mushrooms outside the transect, a practice that Rod has agreed to as long as the samples taken are segregated from those taken within the transect. Finally, he calls a halt. "Now," he says, "it's time for the hard work."

After lunch, we follow Rod to Haywood Community College, which has made a laboratory available to the visiting mycologists. Samples are unpacked and tagged with labels identifying the collector and the location. Their size, color and other technical data are recorded. If no one can identify the species by sight, spore prints are made and chemical tests are run. The samples are then photographed, dried and sent to experts at universities and herbaria to confirm their identification and for permanent storage. It is a long process, and by late afternoon most of the group numbers have left the lab. When I leave, only Rod and three others are still working, photographing and drying samples.

In Chapel Hill, I meet Peter White in his office, which is crammed with papers, books and files. He has curly brown hair and the rumpled, distracted look of an academic, which, among other things, he is. Peter is a professor of biology at the University of North Carolina at Chapel Hill. He is also the director of the North Carolina Botanical Garden. Between those two jobs, he is helping direct the ATBI project in the Smokies. He seems far removed from the dirt-under-the-fingernails set I met in the park. But that impression is wrong; Peter is involved in all aspects of the project.

"Dan Janzen was the spiritual inspiration for ATBI," he says. "But a nonprofit organization called Discover Life in America is

North Carolina has more species of fungi, including mushrooms and their relatives, than any other state in the United States.

At right, the false *turkey tail fungus* (Stereum ostrea) *is another saprophyte that forms on decaying hardwood trees. Below, three mushrooms from an unknown fungus species have been parasitized by another fungus.*

The Great Smoky Mountains have more unique ecological habitats within its boundaries than perhaps any other area of its size in the United States.

supporting the project." Discover Life in America (DLIA) was formed when John Pickering—drawing on his work with Dan Janzen—approached Keith Langdon, the biologist who heads the inventory and monitoring unit at Great Smoky Mountains National Park, with the idea of surveying the park's species. Langdon was enthusiastic, but government restrictions prevented the park from financing the project. Together they hatched the idea of forming a new nonprofit organization to support an ATBI in the Smokies. In December 1997, the park hosted a workshop to develop a plan for an ATBI. Later, DLIA organized a science committee and assigned it the job of overseeing the project. Peter White co-chairs that committee.

The committee's first big problem was how to group the Smokies' overwhelming variety of species. The answer was Taxonomic Working Groups, which soon became known in this acronym-happy endeavor as TWGs. Twenty-one TWGs were established, ranging from algae to plants, from vertebrates to the internal parasites of vertebrates. One of the first TWGs to begin work was Rod Tulloss's group of mycologists. (Another TWG— specializing in Diptera, or flies—also started on the same day.)

A second problem facing the committee was more difficult: How do you count the number of species in a 500,000-acre park? Clearly, scouring the entire park for every virus or oak tree is out of the question. Sampling sites and sizes must be established. Peter believes that 1,000 sites will be required, but the science committee has not yet decided on the size and location of those sites.

The project's scientists have several goals, such as advancing taxonomy (the systematic identification and naming of organisms) and involving the public in science as volunteers, but the park's objectives are more down to earth. Keith Langdon says the ATBI will help the park make better day-to-day decisions on where to route new trails or add campsites. Today, a site selected for a new picnic area could threaten a rare species, and the park might not know it. When the ATBI is finished, park managers will be able to select sites for new construction and be confident that they are not inadvertently endangering a rare fungus or salamander or building on a site that is especially rich in biodiversity.

Langdon also says that ATBI data will help him monitor the health of the park. For example, many scientists suspect that acid rain is killing the park's high-elevation spruces, but might it also have an effect on the mycorrhizal fungi attached to the trees' roots? Maybe the acid rain is killing the fungi and a lack of nutrients is stressing the spruces, making them more susceptible to disease. And if the fungi are dying, what can we do about it? To understand how acid rain changes the park, we must know the fungi as well as the spruces.

Some of that knowledge is now being developed. Rod Tulloss's mycologists found a surprising number of fungi at their collection site. Altogether, the group took 99 samples, about one-half from the transect and the other half from the surrounding woods. When duplicates were eliminated, the result was 65 species of fungi, all collected in a couple of hours on a few acres of land. And that doesn't count microscopic species in the soil and water samples taken by the group; they have yet to be analyzed.

Furthermore, the mushrooms at the site change over time as different species of fungi send up mushrooms. When Rod returned to the park a week later with fewer people, the group found 45 species, many of which were different from those collected the week before. And all of the species were found at only one of the 1,000 collection sites contemplated by Peter White.

How many species of fungi exist in the Great Smoky Mountains National Park? No one knows, but the number is almost certainly in the thousands. Scientists estimate that there are more than 100,000 species of multicellular organisms in the park, but only 10,000 of them have been identified. And they suspect that many of the 90,000 yet-to-be-identified species will be new to science—organisms that have never been described or named. On the day I accompanied the mycologists, they collected two specimens that had never been described, although experts will have to confirm that they are actually new species.

These previously unknown fungi may not solve any human problems. They probably won't cure cancer or the common cold, or even make a better cheese or wine. But the effort to catalog, understand and preserve the biodiversity of Great Smoky Mountains National Park has begun. And Rod Tulloss and his band of merry mycologists have taken the first step. ☒

Phillip Manning is a Chapel Hill writer. His latest book, Islands of Hope, *was published by John Blair in 1999.*

Get Involved

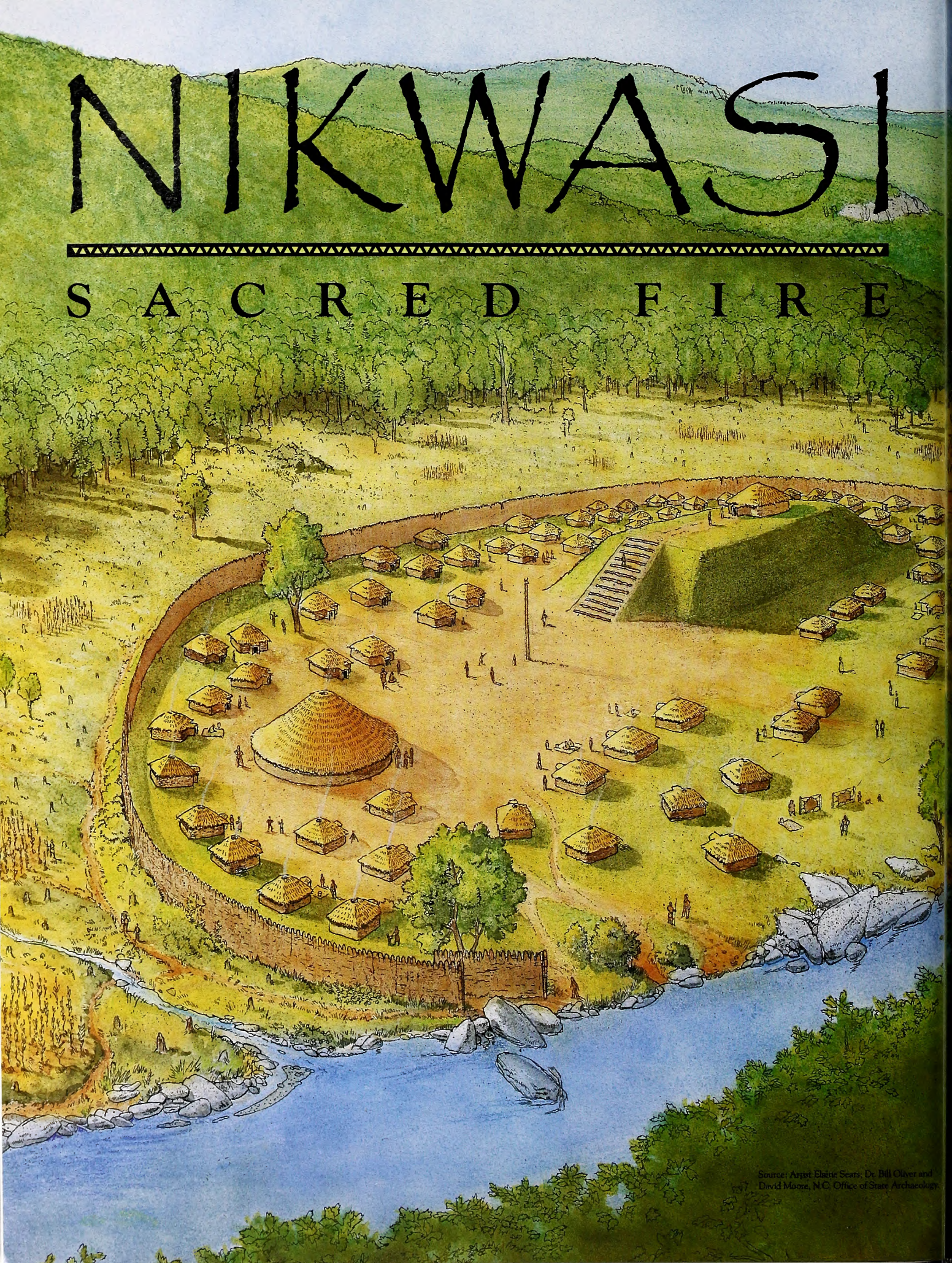
Discover Life in America offers many opportunities for individuals to participate in the Great Smoky Mountains ATBI. Volunteers are needed to assist scientists in their field work. Although no scientific qualifications are necessary, people with an interest in some aspect of natural history are particularly welcome. DLIA also needs volunteers who live near the park to share their homes with visiting scientists.

For more information, contact Jody Fleming, Discover Life in America's executive director, by e-mail at jody@discoverlife.org or telephone him at (423) 430-4752. To learn more about DLIA, check out their web site at http://www.discoverlife.org. The site also lists all of the TWGs, the groups that will be responsible for conducting the biodiversity inventory of the park.

PHILLIP MANNING

NIKWASI

SACRED FIRE



Source: Artist Elaine Sears; Dr. Bill Oliver and David Moore, N.C. Office of State Archaeology

Rising out of the commercial bustle of downtown Franklin, a tall, grassy mound is all that remains of a ceremonial site sacred to the Cherokee.

written by Burt Kornegay ©2000
illustrated by David Williams ©2000

***This artist's conception** shows what the ancient Cherokee town of Nikwasi might have looked like a thousand years ago. At the top of the mound was a council house where the tribe's elders and priests discussed important matters on several bleacher-like benches. The Little Tennessee River flows nearby.*

Nikwasi Mound rises out of the asphalt and concrete of Franklin's industrial district as a spot of green grass, stillness and quiet. The mound is shaped like a flat-topped pyramid, roughly 20 feet high and 450 feet around at its base, with edges that have been rounded by erosion and time. The four lanes of U.S. 441 Business, carrying traffic to and from town, split and curve around it. From nearby garages, tire stores and industrial supply houses come metallic clanks and bangs. And at night the garish lights of a gas station illuminate the mound's individual blades of grass while obscuring every star from sight.

Nikwasi Mound rises into the modern world as an outcrop of the distant human past. It is a prehistoric remnant, a Stone Age monument, a giant artifact of dirt. Nikwasi is so old that even the meaning of the name—also spelled Nequasse, Nockase, Nucasse—has been lost in time. If you try to walk up the mound, you'll find that its slopes are steep. But go around to the side that faces the rising sun, and you'll recognize the remains of an earthen ramp some 80 feet long and 20 feet wide angling to the top.

Recently I walked up the ramp with archaeologist David Moore of the North Carolina Office of State Archaeology, Division of Archives and History. Moore told me that Nikwasi is an example of a Mississippian platform mound, and he estimated its origins date back a thousand years. According to Moore, the building of such flat-topped mounds started with Indian societies in the Mississippi Valley some 1,200 years ago and from there spread to other peoples across the South, including the ancestors of today's Cherokee. The mounds served as platforms for important public buildings called council houses. As we stood on top of Nikwasi and looked around, Moore said that 500 years ago the mound and its council house stood at the center of a Cherokee town, the remains of which now lie under the surrounding commercial district.

Nikwasi's council house, capable of seating 200 or more people beneath its tall conical roof, would have been the most imposing structure in that now-extinct town. Upright interior posts, set in the ground and notched at the top, supported the roof rafters. Smaller posts about 6 feet high formed the building's sides. The

rafters probably were shingled with sheets of decay-resistant chestnut bark, weighted down by a layer of dirt, and the building's sidewalls would have been plastered inside and out with a mixture of grass and clay. Besides a smoke-hole at the roof peak to vent the central fire, the only other opening to the building would have been an entranceway facing the eastern ramp, so low you would have to stoop to enter.

Sacred ceremonies and important meetings often were held inside the council house, but 500 years ago most people would have entered only with permission of those who met regularly inside—the town's chief, priests and head warriors. One non-Cherokee who did go into a council house was the Philadelphia explorer William Bartram, who passed through Nikwasi in May 1775. While staying at the nearby Cherokee town of Cowee, Bartram was invited one night into its council house to attend a "grand festival, music and dancing," and he described what he saw upon entering: "All around the inside of the building, [against] the walls, is a range of cabins or sophas, consisting of two or three steps, one above or behind the other, in theatrical order, where the assembly sit or lean down; these sophas are covered with mats or carpets, very curiously made of thin splints of Ash or Oak, woven or platted together.... [I]n the center the fire is kindled for light, near which the musicians seat themselves, and round about this the performers exhibit their dances... ."

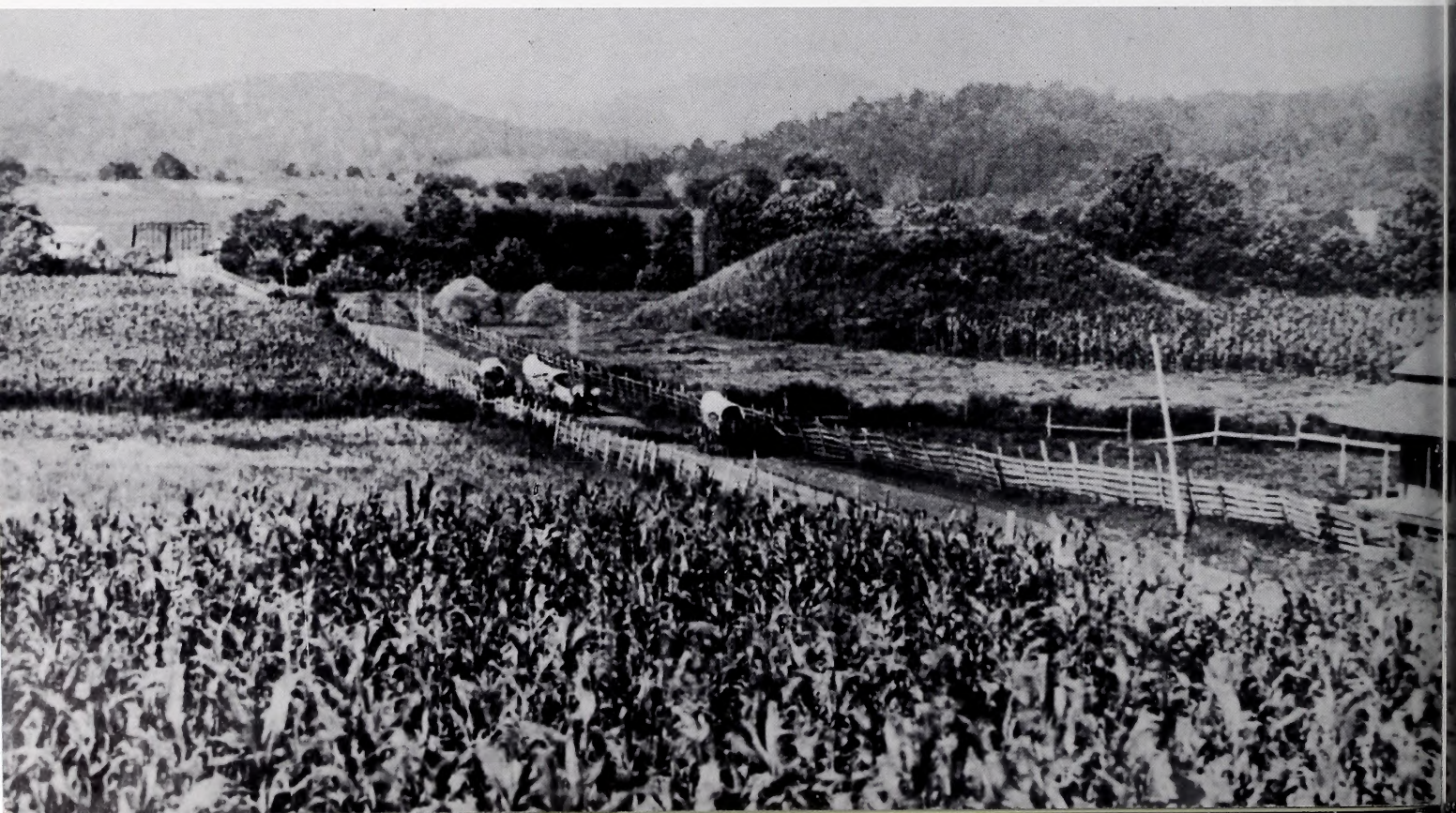
In Bartram's time the earthen ramp that angles down from Nikwasi's council house probably led to a large public square. Here the town held public festivities such as the Green Corn Dance, which celebrated the start of the Cherokee new year; and around a tall pole set in the center of the square, warriors played the game of "chunky," in which they threw spears at rolling disks of stone. Surrounding the square were the village houses, each with a small garden plot. And enclosing the entire habitation would have been a defensive log palisade of upright, sharpened posts. Beyond the palisade, in the rich soil of the Little Tennessee River Valley, stretched cultivated fields where the Cherokee grew their staple crops—corn, beans and squash. And radiating out from the fields, footpaths led into the forest toward other towns.

At one time there were hundreds of mounds like Nikwasi throughout North Carolina and the Southeast. Their imposing presence made the early explorers and pioneers who saw them wonder who the builders were. Bartram correctly attributed the mounds to the "ancients," by which he meant the ancestors of the indigenous people he met. But many observers, believing that the Indians were too lazy and ignorant to build such impressive structures, wrote tracts asserting that the mounds had been raised by a vanished race of "civilized" people whom they called the Mound Builders. One authority claimed the mound builders were Danish Vikings. Another argued that the mounds had been built by the Lost Tribes of Israel. Still others attributed the mounds to migrating Hindus, Egyptians, Polynesians, Greeks, Tartars, Scandinavians, Welsh—to just about any people, in fact, except the prehistoric Indians themselves. The Mound Builder myth didn't die until 1894, when Cyrus Thomas of the Smithsonian Institution, presented overwhelming evidence that the mounds were in fact southeastern Indian constructions.

About the same time that Thomas was conducting his research, the Cherokee wise man Ayunini, or Swimmer, told anthropologist James Mooney that the mounds in Cherokee country had been built by "the ancestors of the *Ani-kituhwagi*." According to Cherokee lore, the *Ani-kituhwagi* were the nuclear group of Cherokee who founded the "mother town" of Kituwah, near present-day Bryson City, and from there spread out to populate the southern mountains. Swimmer explained that when the ancient Cherokee built a mound, they began by kindling a sacred fire in a stone-rimmed pit. Next to this fire they laid the corpse of a chief or priest, along with

Photographed in 1900, *the Nikwasi mound stands incongruously in the midst of agricultural fields. The mound had grown smaller since explorer William Bartram visited it at the end of the previous century.*

MACON COUNTY HISTORICAL SOCIETY



various sacred objects, including "a feather from the right wing of an eagle." Then women carrying baskets of dirt built up the mound, leaving only the sacred fire at the center exposed. As the mound rose around the fire, the builders let down the hollow trunk of a cedar tree and fitted it above the fire as a kind of chimney. When the mound and its council house were finished, the Cherokee appointed a "fire keeper" to keep the fire going and to draw up flames for the council house fire, which had to be kept holy and pure.

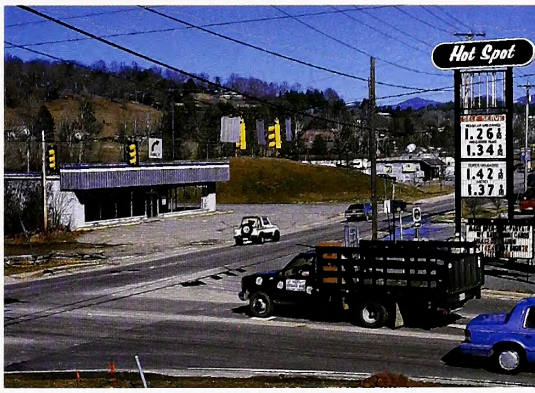
It may never be known if a fire actually burned at Nikwasi's core. And archaeologists say that based on their excavations of other mound sites, the building of Nikwasi probably was more complicated than Swimmer's account indicates, taking place in stages over several hundred years. There might have been a sacred fire at the site a thousand years ago, but if so, it was probably inside a semi-subterranean structure called an "earth lodge," with a roof shaped somewhat like a turtle's shell. Later, when the interior wooden supports of this lodge collapsed from decay or fire, the inhabitants might have filled in the cavity, capped off the fill with a layer of clay, and then built a wooden structure on top. Over time that building would have decayed or burned too. Then its remains would have been covered over with a fresh layer of dirt and another building erected. While touring Cherokee country in 1797, the French aristocrat Louis-Philippe wrote: "The Indians never destroy their town-houses, but when they collapse from age or otherwise, they cover them with earth and clay until they are completely hidden." Finally, under the influence of the Mississippian culture, Nikwasi attained its final shape and size, with a council house on top.

In the last 200 years, Nikwasi may have shrunk in height by 10 or more feet. Macon County historian Barbara McRae explains in her book *Franklin's Ancient Mound* that when the Cherokee gave up the land by treaty cession in 1819 and white settlers moved in, the mound "and the surrounding 'Mound Field' (as old deeds describe it) were fertile farmland. Years of plowing gradually eroded the ancient structure." In 1889, Mooney estimated the mound to be 30 feet tall. In this century the land around the mound was filled in for commercial development, and, as McRae states, this further "reduced the structure's importance in the landscape."

Although every mound, according to Cherokee mythology, had a sacred fire burning within it, Nikwasi was believed to have something else inside it, too—a race of invisible spirit-people the Cherokee called *Nunnehi* or Immortals. According to legend, the Cherokee did not know the *Nunnehi* lived in the mound until one day long ago when a powerful tribe invaded the country, destroying every Cherokee village in its path. Upon the enemy's approach, the warriors of Nikwasi gathered the women and children into the council house to protect them, then sallied forth to do battle, only to find themselves overwhelmed by a superior force. Their fighting grew desperate, and suddenly the defenders saw a strange chief standing among them, who they thought might have come with Cherokee reinforcements from other towns. This stranger told the exhausted warriors to retreat, because he himself would drive back the enemy. The weary Cherokee fell back, only to see hundreds of warriors, armed and painted, streaming out of the side of Nikwasi Mound as if from an opened doorway. Making themselves invisible, these spirit warriors fell upon the attackers, routing them. The only things the enemy warriors could see were arrows whizzing toward them and tomahawks coming down on their heads.

The fact that Nikwasi still stands would seem to suggest that *something* watches over it. Of the hundreds of mounds that existed prior to the coming of the whites, the great majority have since been destroyed. European Americans tended to regard the mounds as readily available sources of fill dirt for road construction or simply as annoying humps that needed to be leveled.

Just 20 miles away from Nikwasi as the crow flies, this distressingly pragmatic attitude manifested itself as recently as 1956 at Western Carolina College (now University). Western lies on the site of a former Cherokee town called *Kullaughee*, and behind the college's McKee Building used to stand a mound. The mound had stood there for centuries; it had even survived ransacking by the Valentine brothers, who in the 1880s dug into Indian sites in search of artifacts to cart back to their Virginia museum. "However," as Western president W.E. Bird put it when interviewed by a newspaper reporter on June 23, 1956, "the space [that the mound occupied] was needed so much for current purposes, it had to be done." He was referring to his authorization the day before for heavy machinery to level the mound. A writer who was there for the leveling described the scene: "Everyone had a field day, as people followed the path of the bulldozers to reclaim arrowheads and bits of bone and pottery." Today a parking lot covers the site.



BURT KORNEGAY

Today, Nikwasi (above) *is a haunting relic of ancient Cherokee life in the bustle of downtown Franklin. The town's residents saved the mound by purchasing it in 1946 as a monument to Macon County's early history.*

Fortunately for Nikwasi, when the mound's owner proposed leveling it for a commercial lot in 1946, residents of Franklin, according to McRae, "launched a campaign to purchase and preserve the site," and schoolchildren came forth like miniature modern-day Nunnehi and "donated their pennies and nickels to the effort." Having raised the owner's $1,500 asking price, the community bought Nikwasi and gave it to the town of Franklin, "with the stipulation that the mound... 'shall be kept as it now stands... as a monument to the early history of Macon County.'"

Today in North Carolina there are just two mounds remaining that are protected and open to the public: Town Creek Mound, near Mount Gilead, and, thanks to Franklin's residents, ancient Nikwasi. ☒

Burt Kornegay is a professional wilderness outfitter and guide and owner of Slickrock Expeditions, in Cullowhee.

To obtain a copy of Barbara McRae's book Franklin's Ancient Mound, *send a check for $7 to Teresita Press, P.O. Box 1114, Franklin, N.C. 28744. For directions to Town Creek Mound, call (704) 439-6802. For directions to other publicly owned mounds, see* Indian Mounds of the Atlantic Coast, *by Jerry McDonald and Susan Woodward.*

Clammer's Delight

written by
Rodney Foushee
photographed by
Lawrence S. Earley

Coaxed by my persistent tugs on the pull cord, the old Mercury outboard spits and finally sputters to life.

I twist the throttle on the tiller and slowly motor my skiff away from the shallow boat landing at Federal Point, mentally preparing myself for the long, shallow run to the clam-filled creeks of Bald Head Island. A rusty clam rake and a plastic bucket hastily thrown into the open boat are all I'll need for today's endeavor. A full-moon tide will guarantee the clam beds are fully exposed.

Carefully, I pilot the boat through the basin, kicking up a muddy trail in a vain attempt to find deeper water. A fleet of colorful windsurfers rides the warm breeze in this protected bay. A half dozen tourists scramble on The Rocks, a mile-long wall built more than a hundred years ago to close off New Inlet. This shallow bay is filling in for sure, I tell myself; every trip I make, the water is shallower.

Once I clear Zeke's Island, a low scrubby piece of semi-dry land, the terrestrial world passes away. Ahead are the seemingly endless marshes of the lower Cape Fear. And at the end of the 5-mile run is my clamming destination—the marshes of Bald Head.

I put the motor in neutral for a few moments to drift with the outgoing tide and take in this vast open place. Life abounds in these

Few things compare to the simple pleasure of clammin

n the solitude of a salt marsh, it's easy to find yourself.

pungent marshes—a skimmer flies by and plucks a single minnow from the surface of the teeming water. A massive loggerhead sea turtle startles me as it surfaces and takes a deep gulp of air—its encrusted head is the size of a dinner plate. I tarry a few minutes more drifting slowly along in the creek. Waiting me out, the turtle finally surfaces again several hundred yards away. I bid the turtle farewell and turn my attention back to the journey.

The entrance to Second Bay is narrow and the oysters are already peeking above the water at the marsh's edge as the pull of the moon peels back the tide. Second Bay is much larger and more open than The Basin, with another long rock wall separating it from the vast Cape Fear River. The rock wall breaks up the otherwise vast and somewhat forbidding expanse of water and also provides some reassurance in the open, watery place as the boat races south following the wall for its entire 2-mile course. The noise of the outboard at full throttle drowns out all sound, allowing me to focus on the visual details of this place. This wall I'm hugging is rich in encrusted sea life—barnacles, mussels, oysters all cling to the massive rocks. Gulls and oystercatchers line the wall. On the other side of the rocks is the mighty Cape Fear River. About halfway down, there is a gap in the wall, broken from some past storm, I suppose, which allows water from the bay to rush out and join the brown river.

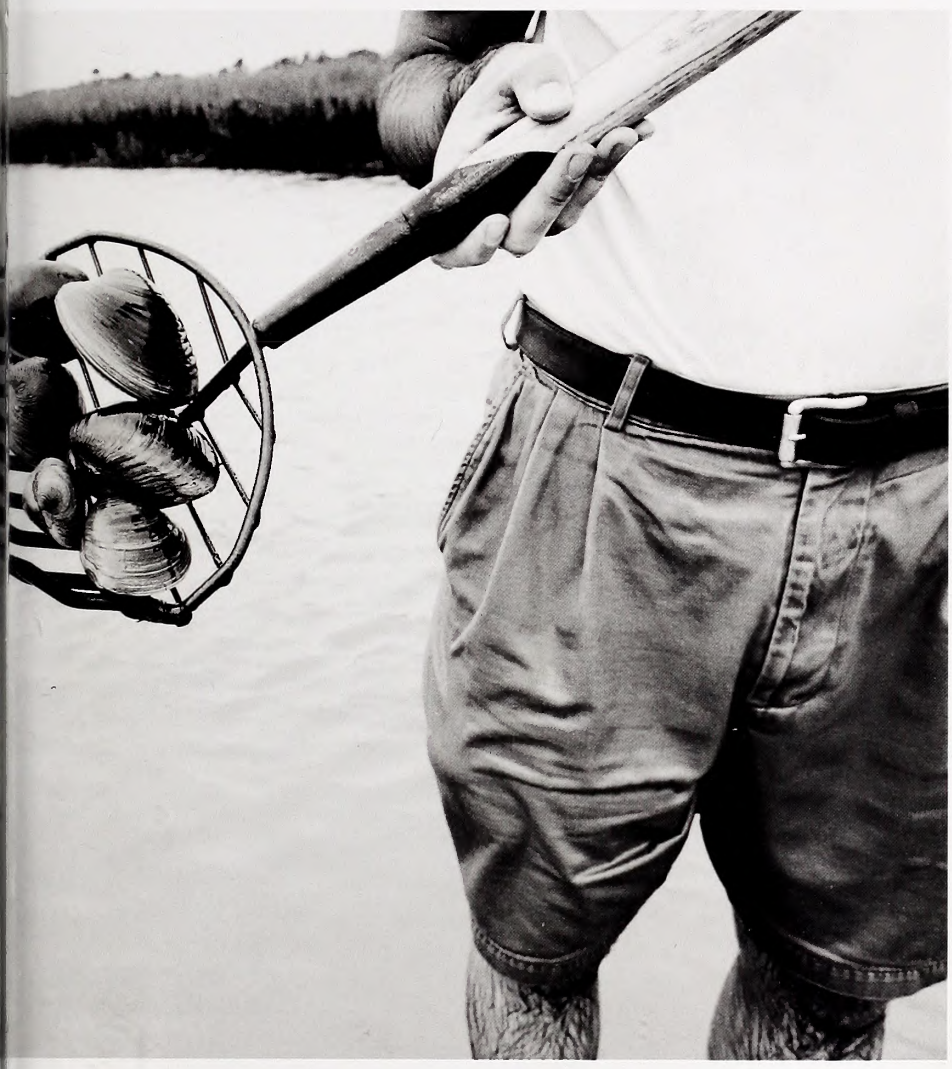
I can finally see a welcomed landmark ahead of me as a speck on the horizon of open expanse of green salt marsh—Old Baldy, the low lighthouse on Bald Head Island. The lighthouse provides a sure reference as the passage narrows back down to a shallow maze of tidal creeks and long oyster bars that marks the entrance to Buzzard Bay. It's plenty easy to get lost in this complex realm of water, spartina, sand and mud. On more than one occasion I've gotten turned around in the maze of creeks.

Still Creek peels off to the right and I follow it, skimming across the 2-foot deep water. Long sandbars etched deep in my memory are beginning to emerge as the full moon continues its pull on the muddy water. The faithful rhythm of the tide is transforming this watery place before my eyes.

Egrets and herons begrudgingly lift from their stalking places in the edge of the rich creek as I blur by. My course curves toward the west now and Southport's familiar blue-and-white water tower stands straight ahead only a few miles but a world away from this massive marsh. It seems low elevation and the Cape Fear River have kept this place separated, for the most part, from civilization. Twisting through Still Creek, I soon reach its conclusion at the intersection of a half dozen creeks and low islands known as Muddy Slough. There's plenty of good clamming here, especially along Shellbed Island. But today my destination is much closer to Bald Head proper. I head south and can see the open Atlantic ahead of me—this is big water. I pass through the Thoroughfare and cross a shallow sandbar into Cape Creek, one of several tidal creeks that twist behind Bald

Head Island. Several twisted pieces of steel—20 feet or more high, mark the entrance to Cape Creek.

The narrow confines of Cape Creek contrast with the wide expanse of the mouth of the Cape Fear and the open ocean. It feels safe here, but this creek is haunted. Huge stingrays fly across its bottom, gliding over the shifting, coarse sand of the river. Tarpon weighing more than 100 pounds frequent these waters during warm weather. And the leaping antics of massive manta rays, though harmless, can put fear in the bravest of souls. Once while trout fishing at the mouth of Cape Creek, a manta with at least a 12-foot wingspan and weighing several hundred pounds emerged from the murky water no more than 30 feet away from my boat. The devilfish rose in the air on its black wings to the level of my terror-filled eyes, then crashed into the water before me. I was so close that I could make out its white underbelly and its vertical mouth parts. To say that I was startled is



With each successive pull of the rake, I can feel my cares lift away.

putting it mildly. The lower Cape Fear River is a big, wild place.

Bald Head Island is privately owned and has been tamed into a resort complete with hundreds of houses and a golf course to boot. In contrast, the marshes bordering the backside of the island have for the most part remained unspoiled by humans. This vast 10,000-acre maze of creeks, bays and salt marsh is a state-owned preserve—collectively called the Bald Head Island State Natural Area. Besides local fishermen, few visit these wild, isolated marshes. Today there is no one here save me—the solitude is comforting.

I head to the back of Cape Creek and ground my boat on a sandy spit within sight of Old Baldy and the palmettos of Middle Island. I clamber out of the boat into the warm brine, and immediately start pulling the clam rake. With each successive pull of the rake, I can feel my cares lift away.

After a few minutes with no success, I abandon the rake and start working on my hands and knees in a small feeder creek. There is a certain amount of faith as well as patience required in clamming. Like many things in life, you've got to put in some effort before the rewards finally start showing up. With experience, you learn to recognize a certain consistency of sand and pungent creek mud that holds the most clams. I dig through the surface of the muddy sand ever closer to the razor-sharp oysters. This is where the young, tender littleneck clams are found, sheltered by the oyster beds from ravenous blue crabs and skates.

My fingertips strike something familiar and I retrieve the first clam from the rich muck. Holding the smooth bivalve in my hand, I briefly marvel at this simple creation. It is solid—heavy and well built for a harsh life of shifting sands and endless tides. The shell is dark, purplish-black, like the color of creek mud. There is a slight semi-circular pattern on the shell with a hint of white at the edge where a hundred tiny interlocking grooves meet. Strong, abductor muscles inside the shell keep the living creature shut up tight and protected.

I toss the clam up on the sandbar and continue my digging. I work the bottom now in a rhythmic fashion, not unlike the movement of the tide, bringing my hands together like two miniature tongs.

The years melt away as I pull more clams from the creek and remember my first clamming trip. I was 8 years old then, perhaps 10. It was a raw winter day and my cousin and I trudged behind my Uncle Johnny in the cold waters of a South Carolina back creek. I remember the shelly sand and the icy water that quickly numbed our young hands.

Clammer's Delight

My uncle dug clams for a living off and on. He taught us to stay put in one place once you hit pay dirt. Clams enjoy company, we quickly learned. "Where there's one, there's bound to be others," he'd tell us before taking a sip from a pint of dark 90-proof he kept in his hip pocket to ward off the cold.

Clamming in winter was hard, but we'd be rewarded for our work at day's end back home on high ground—tossing the clams on a red-hot metal grate over a hissing oak fire. The clams would steam and spit their salty juices as one by one they succumbed to the heat. We'd quickly devour the tasty clams before their shells cooled off much.

A young stingray interrupts my thoughts, one of its delicate wings emerging from the water and lapping at the surface at the edge of the creek 5 feet from me. Undoubtedly, the ray is looking for clams, too.

I return to my digging—squatting with my hands carefully knifing through the sand for the shell-bound prizes, seeing everything and nothing at the same time. I look up from my work and an egret is sizing me up in the spartina grass. The bird is close, I can make out the green of its eye circle. A flock of ibises whirl low over my head, looking for a quiet spot to hunt young shrimp and crabs. They settle into the creek nearby, signifying that I am an accepted intruder, I suppose.

The tide is dead still now, but the marsh continues to yield water in small trickles as the warm wind rustles through the grass. With single purpose, I'm working now to loose the clams among the crabs and mullet minnows in the narrow creek. Young shrimp reflexively jump from the muddy bottom as I disturb them, their prickly horns tickling my bare legs as they flee. Oysters, meanwhile, spit and clack at me—calling for the water to return.

In this rich, wild place, I fancy myself a native—an Indian of sorts—as I methodically work the creek one foot of bottom at a time. My pile of clams is mounting—I've collected at least 75. Time and tide stand still as my native self performs this most basic ritual of gathering food. All other things are forgotten.

The moment is good, but the inevitable return of the tide breaks the stillness. The flood starts as if orchestrated by some invisible maestro. I continue digging for a few more minutes knowing the tide will only increase. There is something reassuring about the tide—it is dependable.

Satisfied with my harvest, I begin to cull the clams, first tossing back the massive chowders—the big, chewy adult clams that sometimes reach softball size—that are good for little more than chowder. Next, I work my way through the cherrystones, the next largest grade, about the size of my palm. They are good to eat but can get a bit chewy, so I keep only a few of these. The remainder are littlenecks, the tiny, barely legal clams, and their slightly larger kin, topnecks. I keep all of these, which are perfect for steaming.

My bucket is heavy now with clams as I retrace my muddy steps back to the boat, using the clam rake for support. The tide is coming in fast as I glance back to see my prints fill and disappear in the dark water.

The afternoon sun is already low on the marsh as I fire up the motor. The tide is racing in now, and I mentally go over the twists and turns of the return trip. It's a long way in a small boat—it will be a race against the light, but I'm confident I can make it.

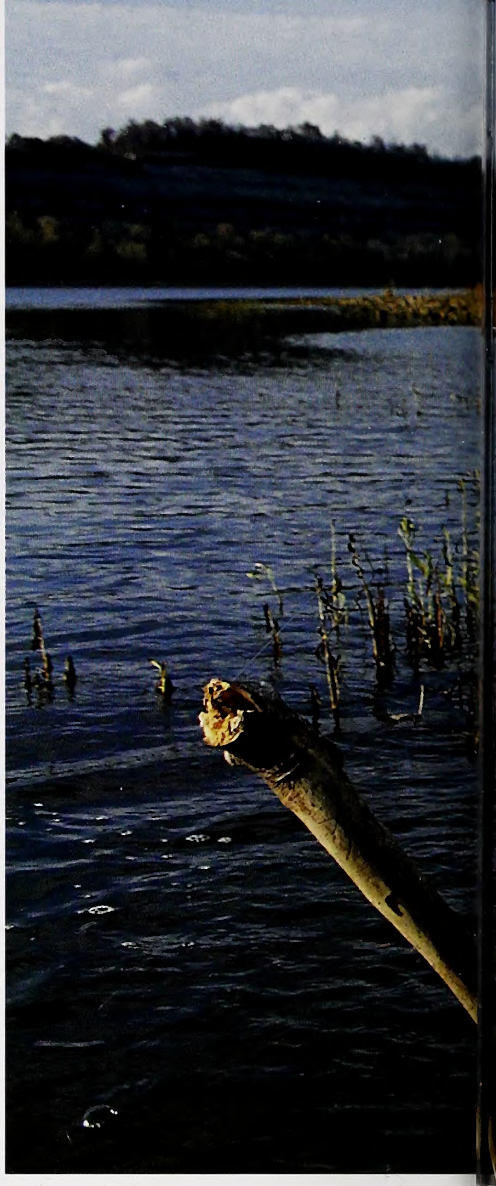
I pick my way back through the sandbars and the fleeting oyster reefs toward the landing at Federal Point. A big smile forms on my face as I reach the familiar breakwater of the Second Bay. I'm almost there now. I cut the motor and drift in the swirling current. The salty river has reversed itself and is pouring into the bay now through the breach. I am once and always at peace here as the big orange sun melts away into the river. The faithful tide has once again washed away my cares and soothed my restless soul. ⊠

My bucket is heavy now with clams
as I retrace my muddy steps back to the boat.

Mr. IN-BETWEEN

It loves to prowl rocky and shale-covered lake bottoms in search of crawfish, but the spotted bass is just as likely to be found chasing a school of shad.

written and photographed by Soc Clay ©2000



A slight breeze from the west played along the shoreline, catching the sleek sides of the canoe enough to propel the 17-foot watercraft forward. The lifting wind swirled the foggy mist, creating dancing images in the low pre-dawn light. The relaxing mood was strong enough to cause my eyelids to droop, reflecting the short night's sleep due to my late arrival at the camp. I eased the paddle into the surface and pushed the canoe ahead, bringing it into a course parallel with the shoreline, some 30 feet from the bank.

As if by magic, the relaxing mood of the fog-bound morning was suddenly transformed by an orange glow as the bright orb of the sun peeked its way above the distant ridgeline. The light of morning became an alarm clock for feathery creatures in nearby bushes. The flute-like notes of a wood thrush greeted the beginning of a new day with its clear two-note call.

"This is prime territory for spots," my longtime friend and fishing companion Charlie said in quiet tones from the bow seat of the canoe. "A fellow back at the dock said anglers had been finding spots up to 3 pounds along this bank for more than a week."

Charlie and I both had strung 9-foot fly-rods back at the dock. I'd tied on a thumb-size Sneaky Pete and used an 18-inch drop leader tied to the hook eyelet to attach a No. 4-size Bream Killer.

Charlie was going with a 1/24th-oz. Fly-rod Hula Popper, in case the spots needed a little noise to arouse their interest.

We'd also rigged two spinning outfits to try for spotted bass on the foggy morning. I planned to fish a 375 A.C. Shinner in black and silver finish, while Charlie had opted to cast a deep Wee Crawfish. The small crustacean look-alike can be deadly for spotted bass prowling shoreline structure in search of crawfish.

Reflecting a bit as we prepared for the morning's fishing, I couldn't help but recall my first sportfishing ventures more than four decades back, when I really became serious about catching bass. A fellow who married my first cousin came by the house one day and invited me to go fishing in a nearby stream.

I wound up with his spinning rod, throwing as best I could a tiny MirroLure that resembled a small baitfish coming through the water. I caught two bass that my partner called smallmouth but were actually spotted bass, as I would later learn. Those high-jumpers that weighed in at about a pound and a half each would leave a lasting impression on me. I've been fishing for spotted bass ever since.

Later, I started catching spots beside stumps and lay-down logs using Hula Poppers. These lures worked best when cast 2 to 3 feet beyond the target and left motionless for a few moments. Then, as the directions read on the lure box, I barely eased the lure to life by twitching the end of my rod.

***This angler appears** to have his hands full. Pound for pound, the spotted bass is one of the hardest fighting members of the bass family.*

The action caused the cupped-out head to nod and the rubber skirt to fan. Often, a terrific explosion on the surface would follow, as a spot clobbered the popper, jerked it under, then immediately leaped for the heavens. Often the hook would dislodge, sending the lure flying.

Charlie was gracious enough to let me have first try at an old stump that had once supported a tall oak, but had been cut and buried beneath the rising waters when the lake was formed nearly a half-century before.

Surrounding the stump was a broken edge where a shale bank had been exposed by decades of erosion. Shale often attracts spotted bass and in this case, especially so, with the addition of the stump and much of the exposed root system reaching into several feet of water. It was a perfect place to house the object of our search that foggy morning.

I was proud of my first cast. The lure fell daintily onto the surface 2 feet on the bank side of the stump. I let it rest for a few seconds before twitching it to life. By moving the rod sharply, the line pulled the lure quickly to one side, making it flash in the water like a minnow that had suddenly sprung to life.

The first movement, I hoped, would cause any bass living near the stump to take notice of the presentation before I began to work it past the spot where I'd have hung out if I were a bass.

There aren't many readers around who are old enough to remember the teaching of "Peep-Hole" Hall, but I do. Peep-Hole was an old bass chugger from the Carolinas who was written about frequently during the 1950s, when topwater fishing for bass was in its heyday in the South.

Like most bass fishermen of the period, Peep-Hole advised anglers to cast to a bassy-looking spot, allow the lure to plop down on the surface 2 to 3 feet beyond where the bass might be hiding and let it stay there long enough to load, tamp and light a pipe. The idea, the old man said, was to make the presentation look like a terrestrial bird or small animal had fallen into the water, was momentarily stunned by the impact and was just beginning to recover with the first twitch of the rod tip.

I'm always leery of catching a bass on the first cast. Too often, such luck has meant few fish the remainder of the day. Nonetheless, I welcomed the explosion of water that engulfed the floating minnow the instant I moved it into action. "Spot! Bet a nickel!" shouted Charlie, making a prediction an instant before the chunky, football-shaped bass climbed onto the surface, dancing a good 3 feet.

Three more powerful leaps and as many power runs against the bowed fibers of the rod convinced the bass it was useless to resist.

***Spotted bass can be** found along rock- and shale-covered bottoms as well as near structure such as stumps and trees. A popping bug or a crayfish crankbait is usually enough to entice one of these bantam-weight brawlers.*

I eased it close to the canoe and was able to slip the barbless hook free without touching the fish. The feisty brawler showed its gratitude by flipping water into my face when it realized it was free and smacked its broad tail fin onto the surface to make a dive.

"There's a fish with an attitude," grinned Charlie, before sending his own surface creation to yet another target along the bank.

Late summer and early autumn are prime times to find spotted bass in shallow water. This member of the black bass family, which has been referred to as "Mr. in-between," loves to prowl rocky and shale-covered lake bottoms in search of crawfish, but will as likely be found chasing a school of shad. Charlie, like myself, has had a lifelong love affair with spots. "You'll find spots in habitat that largemouth love, but you'll also find them cruising pea gravel-covered points just like a smallie does," he said.

Indeed, veteran spotted bass anglers agree that if it were possible to cross a largemouth with a smallmouth, the result would in all likelihood be a spotted bass. But even though naturalist Constantine Samuel Rafinesque first identified the spotted bass as a distinct species as early as 1819, ichthyologists didn't recognize the fish until as late as 1927. Many anglers to this day are completely puzzled with the spot's identity.

However, as early as 100 years ago, fishermen chunking plugs and delivering big cork-bodied fly rod bugs along the drainages of rivers in North Carolina had no trouble identifying the species. The late W.W. Walker, a noted bass bugger who fished the rivers of central North Carolina, stated many years ago that the spotted bass is the color of a largemouth but shaped like a smallmouth, and "fights like old Billy hell turned loose!"

Spotted bass are naturally smaller than their two close kinfolk. The current all-tackle record for the species is an 8-pound, 15-ounce trophy taken from Lewis Smith Lake in Alabama in 1978. Ken Mofitt set the North Carolina record for spots with a fish weighing 5 pounds, 15 ounces that he caught from Lake Chatuge in 1992.

Spotted bass are native to watersheds ranging from Texas to Michigan's Lake Erie. During the past several years, this princely battler has been introduced to many regions of the United States and appears to be growing to bragging size aplenty in far-western waters.

Spotted bass have long found the warmer waters in central North Carolina to their liking. They also became principal players in lakes formed on these rivers during the past 40 years. A 3-pound fish is considered a prize in most lakes, but they rarely reach that size in streams and rivers. The species does pose a problem in some lakes because spotted bass are so aggressive they often drive larger smallmouth and largemouth out of their own habitat.

But spotted bass are the ideal target for bass buggers. They are aggressive feeders and love to feed on crawfish, which in most lakes and rivers means they feed mostly in shallow water—well within reach of the fly rod bug.

In lakes, shoreline riprap areas can attract larger spots, which come to probe among the cracks and crevices searching for crawfish. Fly-rodders can cash in on spots early in the season by working areas that contain rocky or gravel bottoms, and the fish love to hide in the shadow of woody cover close to the surface. They are also turned on by a commotion. That's why if these fish refuse to take a quiet offering, a noisy one will usually do the trick.

Look for spotted bass to take up residence any place where two currents mix. The mouths of tributaries are especially fruitful for these battling creatures. I also find lots of spots on the upstream end of islands where the current parts. The spot will be located at the edge of the swirling eddy water where it meets the current. And never overlook even a single protruding stick in either of these places. If there's enough cover to hide the spot's eyes, the fish believes it is hidden and will utilize even finger-sized branches as ambush locations.

In autumn, spotted bass often school up and attack schools of shad and emerald shiners, surrounding them like a pack of white bass. Any boils or other surface disturbances that indicate minnows are being chased should be responded to by placing a surface chugger right smack in the middle of the melee.

As with most bass, early mornings and late afternoons are always the best bet to find spots in the shallows. On heavily overcast days, or if a hard rain washes enough silt into the water to cloud up the shoreline, the fish are apt to hang around shallow cover for most of the day.

While the sport is rarely practiced in the South, spotted bass can also be taken readily when they suspend in schools according to year class, as they frequently do in late summer and autumn. Often, these fish remain suspended at depths ranging from 20 to even 50 feet in some lakes, posing a real challenge to anglers who often resort to the use of jigging spoons and blade baits jigged vertically.

Fly-fishing tackle needed for fishing spotted bass on the surface calls for 8- or 9-foot rods in 5 to 8 weight. These can be matched with either a bug taper or level floating line and a 6- to 8-foot leader tapered to 3X. I've even seen buggers use short lengths of 30-pound-test monofilament to turn heavy bugs over during windy conditions.

Catching a bragging-size spotted bass won't cause the brows of most bass anglers to raise much. Still, chances are you won't soon forget the thrill of battling this in-between bass, which some claim is the toughest, pound for pound, of all the black bass family. ⊠

On the SPOT

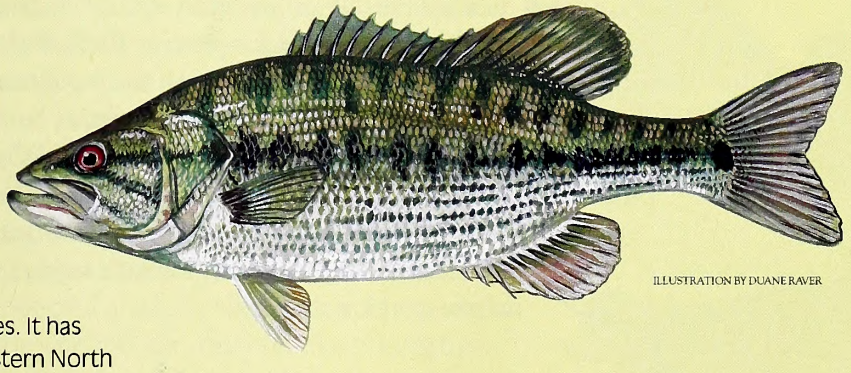


ILLUSTRATION BY DUANE RAVER

The spotted bass (Micropterus punctulatus) is native to the Mississippi River Basin, including the Tennessee River and some of its tributaries. It has been introduced into other waters in western North Carolina and is now common throughout the Hiwassee and upper Yadkin river basins. Chatuge and W. Kerr Scott reservoirs support significant spotted bass fisheries. The spotted bass is generally smaller than the largemouth or smallmouth bass, rarely exceeding 5 pounds. However, the versatility of the spotted bass seems to give it a competitive edge in some waters where it has been introduced.

Chatuge Reservoir lies on the North Carolina-Georgia line in Clay County.

Before 1980, smallmouth bass was the most important fishery in the reservoir, accounting for two-thirds of all black bass caught. During the early 1980s, the spotted bass first appeared in Chatuge, probably introduced by fishermen who had enjoyed catching the species in other reservoirs. During the next 15 years, the spotted bass became more numerous and smallmouth bass became more scarce as the "spots" quickly colonized the feeding and spawning areas once used by the smallmouths. By 1995, smallmouth bass represented less than 10 percent of Chatuge's bass fishery. Because the smallmouths were greatly outnumbered by spotted bass in their spawning areas, interbreeding began to occur, producing hybrid fish with characteristics of both species. Genetic studies of the two species found that about one fish in five was a smallmouth/spotted bass hybrid; this meant that even fewer "pure" strain smallmouth bass remained in the reservoir.

Although the appearance of the spotted bass in Chatuge led to the decline of the smallmouth fishery, it would be unfair to say that the spot's introduction ruined fishing in the reservoir. Though anglers can no longer expect to catch smallmouth, the largemouth bass fishery remains strong. The spotted bass themselves have also grown into a popular sport fishery, and Chatuge anglers can still expect a diverse and challenging bass fishing experience.

—David Yow, N.C. Wildlife Resources Commission
fisheries research coordinator

She was a soft-spoken woman with a fierce love of the natural world. With words that were elegant, her writing brought woods and waters to life. Rachel Carson was

Nature's Poet

written by Julie Dunlap ©2000 */ illustrated by Consie Powell*

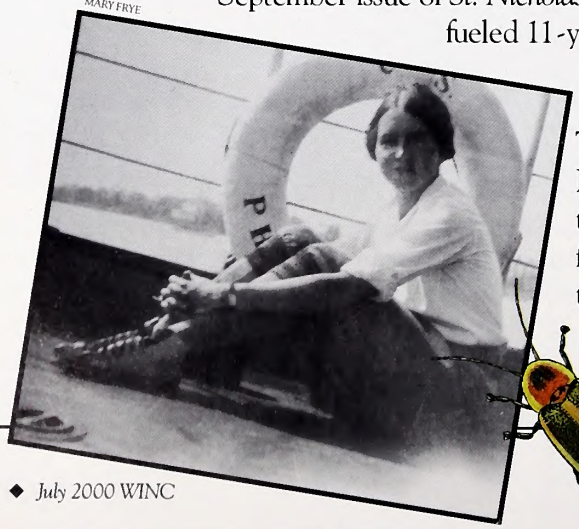
Spring was the noisiest season on the Carson farm in Springdale, Pennsylvania. Young Rachel Carson, born May 27, 1907, loved every sound. Bluebirds sang among the apple trees, cows called from the milking shed and chicks peeped after they hatched in her hands. Each *twitter*, *moo* and *cheep* told Rachel that the farm was healthy, the land was alive.

Years later, Rachel recalled herself as "a solitary child." No neighbors lived nearby, and her older brother and sister felt too grown up for playing. Rachel's best friend was her mother, Maria. Mrs. Carson often kept Rachel home from school, fearing illnesses, and taught her lessons outdoors instead. From her mother, Rachel learned to name plants by their blooms and insects by their voices, to observe carefully and to sketch what she saw. Whenever she collected crickets or other creatures to study, Mrs. Carson insisted Rachel release the captives unharmed.

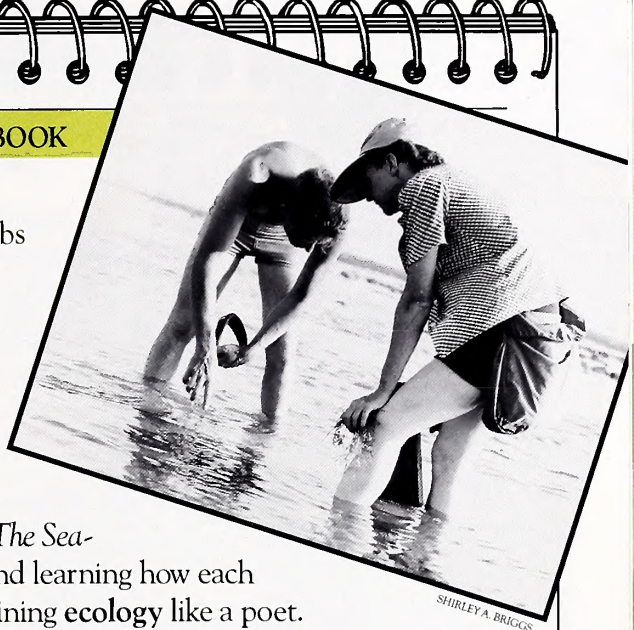
Her mother's lessons meant so much to Rachel that she later wrote, "I can remember no time when I wasn't interested in the out-of-doors and the whole world of nature."

Sometimes, Rachel ran with her dog, Candy, to the Allegheny River. Lying on the bank, she dreamed of visiting the far-away ocean. Sea poems and stories often caught Rachel's eye in her favorite magazine, *St. Nicholas*.

In May 1918, *St. Nicholas* announced a writing contest for its young readers, and Rachel grabbed her pen. Many hours and crossed-out lines later, a 253-word adventure (about a brave pilot in World War I) was ready to mail. Rachel waited, longing to see her story in print. The September issue of *St. Nicholas* arrived at last; Rachel had won a Silver Badge! The prize fueled 11-year-old Rachel's determination to become a writer.



In college, Rachel's writing won her praise and more prizes. Then a biology class revealed a new world of nature to explore and Rachel began questioning her future as a writer. People warned: there are no jobs for women in science. Yet she boldly signed up for graduate study in **marine zoology** and visited the ocean for the first time. Standing on a Massachusetts beach, Rachel listened to waves and touched seaweed. She knew she had made the right choice.

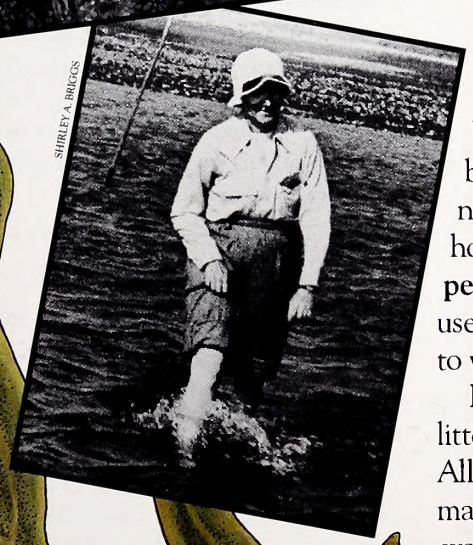

SHIRLEY A. BRIGGS

Finding work was still tough. In the 1930s, hard times made jobs scarce for men and women. Rachel taught biology part-time and struggled to pay her bills, especially with a widowed mother to support. One day she interviewed for a job with the **U.S. Bureau of Fisheries**. They needed a scriptwriter for a radio show about sea life. Rachel would be a writer *and* a scientist!

The script-writing job grew until Rachel led the Bureau's whole publishing program. Long work hours exhausted her, yet she wrote late into the night on projects of her own. Readers of her first book, *Under The Sea-Wind*, entered the realm of fish and sea birds, sharing their daily lives and learning how each species depends on many others. Critics applauded Rachel for explaining **ecology** like a poet. Rachel simply said that she tried "to make animals in the woods or waters, where they live, as alive to others as they are to me."

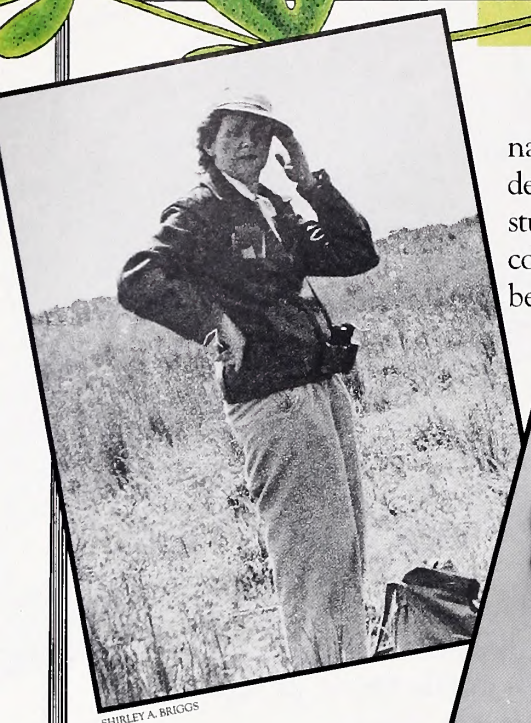
SHIRLEY A. BRIGGS

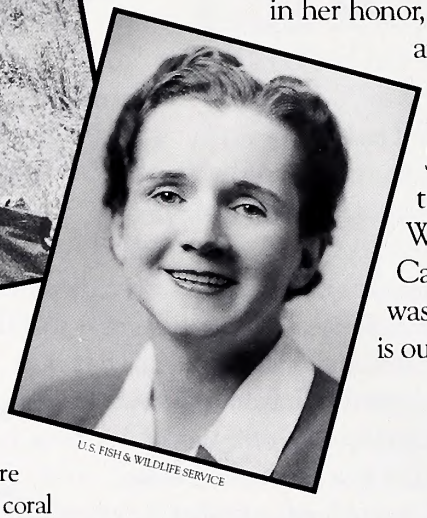
Whenever she could, Rachel escaped her writing desk to study the sea. In Florida, she sank below the waves in a diving suit to view a **coral reef**. In Maine, she spent so long gathering urchins and periwinkles in icy tide pools that her legs went numb. One favorite spot was North Carolina's Outer Banks. Leaving her mother in a vacation cottage, Rachel kayaked through salt marshes or lay on sand dunes, listening to wind rattle the cordgrass. At night, she waded knee-deep across **mud flats**, searching with her flashlight for buried clams and tracks of horseshoe crabs. She collected animals, taking careful notes on all she saw and felt, then set everything free. Back home in Maryland, she wrote of her discoveries.


SHIRLEY A. BRIGGS

Best-selling books freed Rachel to quit her job and build a summer home in Maine. As she planned more books, including one about exploring nature with her grandnephew, Roger, a troubling letter arrived. A friend described horrible deaths of songbirds caused by **DDT**, a chemical **pesticide** sprayed to kill unwanted insects. Careless chemical use could silence the voices of spring forever. Rachel vowed to warn the public of the danger.

Hundreds of scientific papers about pesticides soon littered her desk, plus letters from experts around the world. All she learned frightened and angered Rachel. Pesticides, made to protect gardens and crops, were poisoning wildlife, water and even people. For four long years, despite her mother's death and her own illnesses, Rachel kept writing.


SHIRLEY A. BRIGGS


U.S. FISH & WILDLIFE SERVICE

Silent Spring was published in 1962. Pesticide makers called Rachel names and accused her of lying. Though weak from cancer, Rachel defended herself in speeches, urging new laws to limit pesticide use and studies to find natural methods of pest control. The public admired her quiet courage and listened. For the first time, many people began to ask: How can human beings protect the earth?

Rachel died of cancer on April 14, 1964. A wildlife refuge in Maine is named in her honor, and people can explore the North Carolina dunes and mud flats she loved at the Rachel Carson National Estuarine Research Reserve near Beaufort. Yet she is most remembered for one book, *Silent Spring*. Rachel's beautiful words reveal ugly truths about pollution and call the public to action. We can live on a healthy planet teeming with life, Carson wrote, or in a world poisoned with our own wastes and pollutants. She said, "The choice, after all, is ours to make."

What Does It Mean?

coral reef: underwater structure made up of living and dead coral
DDT: abbreviation for dichloro-diphenyl-trichoroethane, a chemical pesticide
ecology: the study of living things in relation to their environment
marine zoology: the study of ocean animals
mud flats: silt-rich land covered at high tide and exposed at low tide
pesticide: a chemical or other substance used to kill unwanted insects
U.S. Bureau of Fisheries: federal government office in charge of fish resources in the early 20th century, later became part of U.S. Fish and Wildlife Service

Read and Find Out

- *Under the Sea-Wind* by Rachel Carson, Penguin, 1996.
- *The Sea Around Us* by Rachel Carson, Oxford University Press, 1989.
- *The Edge of the Sea* by Rachel Carson, Houghton Mifflin, 1998.
- *Silent Spring* by Rachel Carson, Houghton Mifflin, 1962.
- *The Sense of Wonder* by Rachel Carson, HarperCollins, 1998.
- *Listening to Crickets: A Story about Rachel Carson* by Candace Ransom, Carolrhoda Books, 1993.
- *Rachel Carson: The Wonder of Nature* by Catherine Reef, Twenty-First Century Books.
- *Rachel Carson: Voice for the Earth* by Ginger Wadsworth, Lerner Publications, 1992.
- *Rachel Carson: Witness for Nature* by Linda Lear, Henry Holt, 1997.

Some websites about Rachel Carson:

- Rachel Carson's Homestead: www.rachelcarson.org
- Rachel Carson National Estuarine Research Reserve: www.ncnerr.org
- Rachel Carson Council: http://members.aol.com/rccouncil/ourpage/rcc_page.htm

It's WILD!

Project WILD Activities for teachers and students that correlate to this topic include:

Wild Words: teaches students to observe and describe their surroundings.

Deadly Links: teaches students to understand the ways that pesticides enter food chains, and the resulting consequences.

No Water Off a Duck's Back: teaches students about adverse effects of oil spills and other pollution.

Ethi-Reasoning: teaches students to examine values and beliefs related to wildlife and the environment.

Enviro-Ethics: teaches students to examine various actions that are harmful and beneficial to the environment.

Deadly Waters: teaches students to understand different kinds of pollution that affect aquatic animals and plants.

Get WILD

Advanced WILD Workshops:

July 11-14 – *Wildlife Technology*, North Carolina Forest Service Training Center, Crossnore. Contact T.M. Lemon, (336) 957-4382.

August 1-5 – *Air Quality*, TN & Crossnore, Contact Anne Hice, (336) 674-6152.

August 2-3 – *Bats*, Cradle of Forestry, Pisgah Forest, Contact Cindy Carpenter (828) 877-3130.

Editing and design by Consie Powell. Art puzzle by Anne Marshall Runyon. Photographs used by permission of the Rachel Carson History Project.

North Carolina WILD Notebook

Get Outside

Read aloud: Savor Rachel Carson's poetic language while learning about North Carolina's sandy shores by reading "The Rim of Sand," a chapter in *The Edge of the Sea.*

Go collecting: Capture crickets, fireflies, toads or other harmless creatures, taking notes on where you caught them. Photograph or sketch the animals, then return them to their homes unharmed. Only shells, shed skins and other non-living objects should be kept permanently.

Comb the beach at night: Explore the seashore after sunset to discover an unknown world of wildlife. A flashlight will reveal the secret homes of ghost crabs and other night-crawlers. Turn out your light and lie on the sand, using all your senses. What can you learn from the sounds and smells? How do you feel? Write it down!

Wade across a mud flat: Roll up your pants, take off your shoes and squish your toes in the mud. Dig around with your fingers. Rachel Carson loved to just poke around outdoors, so don't hurry. Have fun. Get wet! Look up once in a while, though, to see if you can spot an osprey. That's just one bird Rachel Carson helped to save by pushing for a ban on DDT.

Visit the Rachel Carson National Estuarine Research Reserve near Beaufort. Take a tour from the North Carolina Maritime Museum on Beaufort's Front Street (919-728-7317) or boat there on your own.

Lost in the Doldrums. . .A Sargasso Sea Search Game

"The Sargasso is a place forgotten by the winds. . . .Under the seldom clouded skies, its waters are warm and heavy with salt. . . .

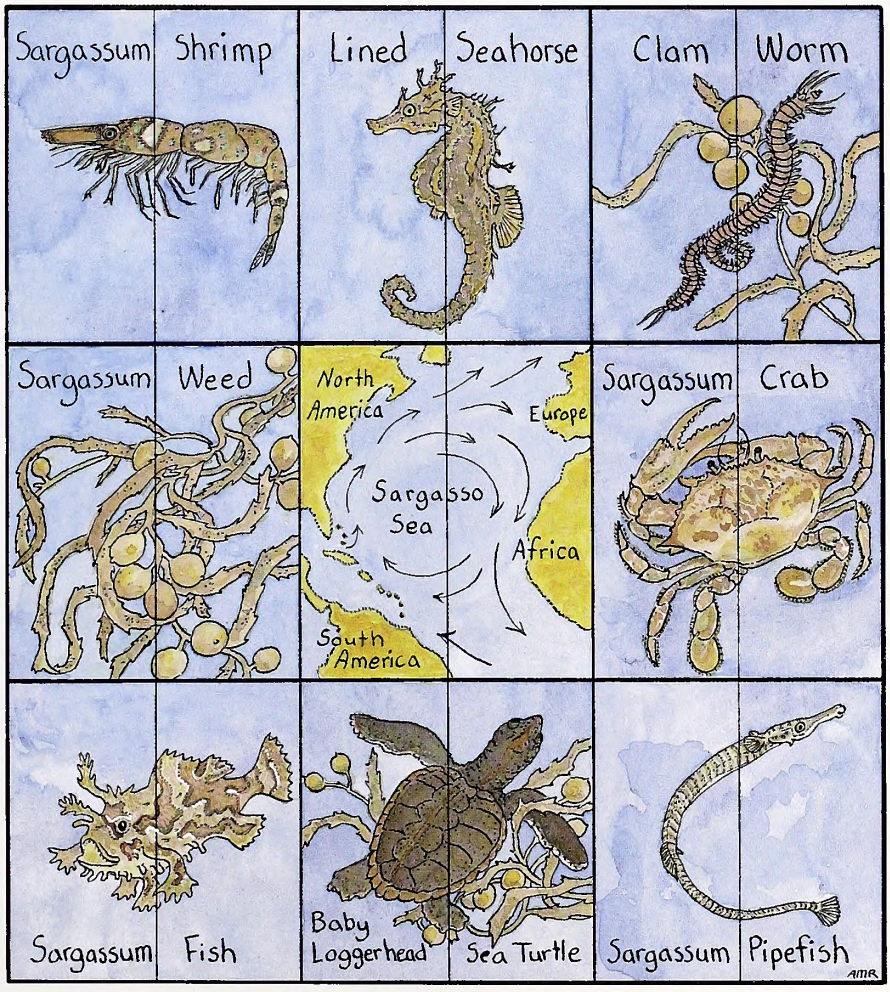
For the plants that reach the calm of the Sargasso, there is virtual immortality. . . .Here, in the heart of the Atlantic, the weed drifts endlessly. . . .

Curious things happen to the animals that have ridden on the sargassum weed. . . .Once they lived near the sea's edge. . . .Now in the middle of the ocean, they are in a new world."

—*The Sea Around Us*
by Rachel Carson

Directions: copy art at 150 percent. Cut out the cards. Cut each in half. Shuffle and spread out, face down.

- First Player: Turn one card face up. Turn another up. If they match, keep them and play again. If different, put them back face down.
- Now Second Player tries the search.
- Continue until all the cards are taken.



Ginseng Marking Program Saves Endangered Plants from Poachers

N.C. NATURAL HERITAGE PROGRAM

Because of ginseng's *medicinal qualities, illegal harvest of the plant (shown above) has skyrocketed in recent years. A new program has been developed to mark these wild plants, enabling N.C. Department of Agriculture inspectors to detect illegally harvested ginseng.*

A relatively new method of marking endangered ginseng roots has resulted in the conviction of 80 poachers in North Carolina since the state started the program in 1993.

"The theft of ginseng and other endangered species is a serious problem in North Carolina," said Agriculture Commissioner Jim Grahm. "In addition to helping maintain levels of endangered ginseng and other plants like galax, the marking is protecting legitimate dealers and consumers who depend on ginseng for income or as a nutritional supplement."

Pioneered by Jim Corbin, with the N.C. Department of Agriculture & Consumer Services, the marking program involves spraying a calcium-laced die mix on the ginseng plants in the wild. Agriculture officials have traveled 820 miles on foot, marking the plants. The die is harmless but allows officials, during routine inspections, to detect unlawfully harvested ginseng, said Corbin. He declined to elaborate on the process, citing the need for confidentiality.

"The program began as a cooperative effort with the Great Smoky Mountiains National Park," Corbin said. "The park had a problem with people taking protected plants including ginseng."

Other agencies have also become involved in protecting wild ginseng, including the N.C. Wildlife Resources Commission, the U.S. Fish & Wildlife Service and the U.S. Forest Service. In recent years, the Wildlife Commission's Division of Enforcement has used canine teams to sniff out ginseng poachers.

The theft of ginseng, considered a special-concern plant, or any other endangered plant species is considered a felony.

—Courtesy of the N.C. Department of Agriculture & Consumer Services

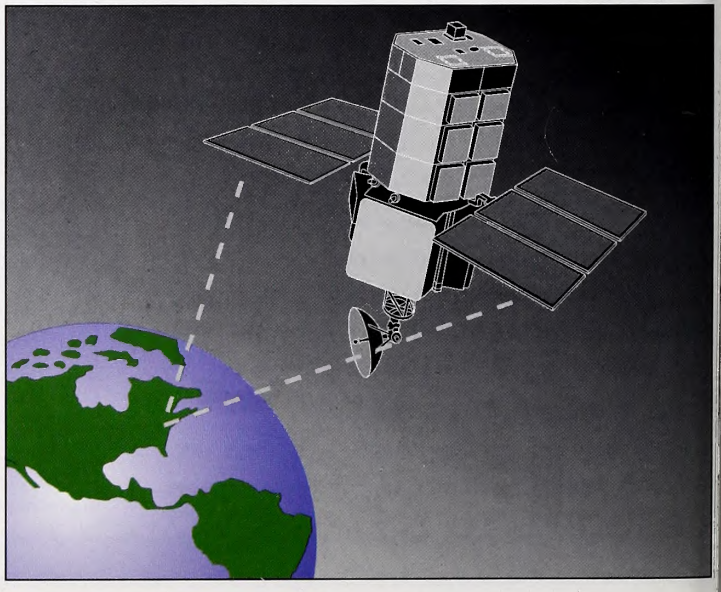
Global Positioning Systems Now More Accurate

Boaters and other users of Global Positioning Systems (GPS) will find their instruments accurate to within 30 feet instead of 300 feet, following a recent recommendation from Secretary of Defense William Cohen.

The White House announced that the intentional distortion of the signal used by civilian Global Positioning Systems would be eliminated. The U.S. Department of Defense implemented the intentional flaw in the early 1980s to deny hostile use of the maximum-accuracy benefits of GPS. However, U.S. officials say the technology now exists to jam the civilian signal during a time of national crisis.

GPS works through a system of 24 satellites that allow navigation by either a civilian or military signal. The military signal is accurate to within 30 to 60 feet, and the civilian signal had been accurate to within about the length of a football field.

GRAPHIC BY LEE RATCLIFFE



Edited by Chris Powell

North Carolina Outdoor Calendar of Events

On several occasions, events in this calendar have been changed without notice. Readers should check with the contact listed before traveling to an event. Items for listing should be conservation oriented and should be sent at least four months in advance.

July 8

The Pisgah Center for Wildlife Education, located near Brevard, will conduct the Mosses and Lichens of Southern Appalachia program from 2 to 4 p.m. Presented by a University of North Carolina—Asheville biology professor, this program is designed for children ages 12 and up and consists of a slide show and hands-on identification. For more information, call (828) 877-4423.

July 12, 13

The Pisgah Center for Wildlife Education, located near Brevard, will conduct the Nature Nuts—Stream Life programs from 9 to 11 a.m. and 1 to 3 p.m. July 12. On July 13, the program will be held from 9 to 11 a.m. Nature Nuts is a program series for children ages 3 to 7 and their parents or guardians. Each program focuses on a different wildlife theme. For more information, call (828) 877-4423.

July 15

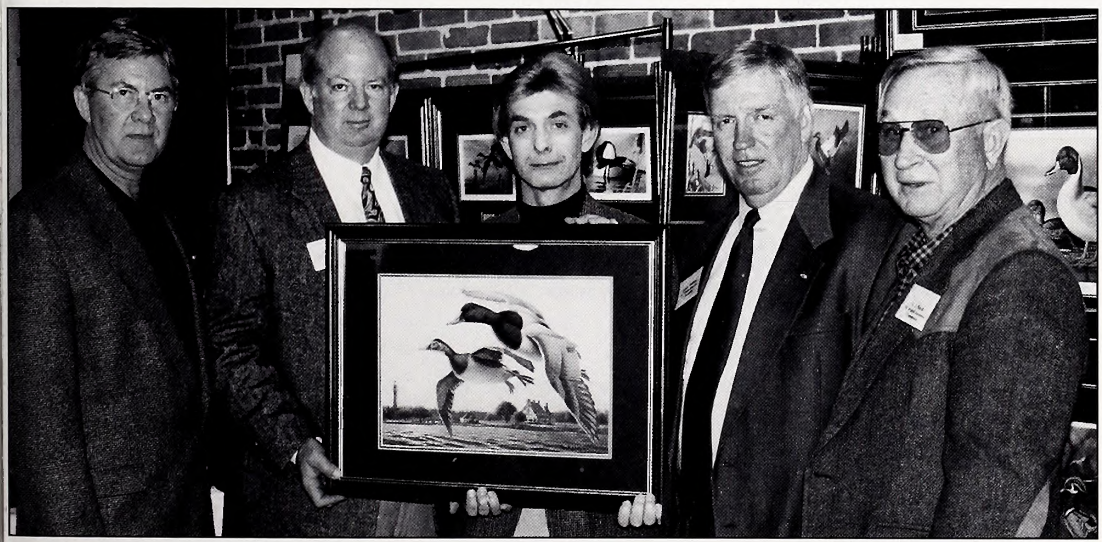
The Pisgah Center for Wildlife Education, located near Brevard, will conduct the Be a Tree Sleuth program from 9 a.m. to noon. Designed for children ages 16 and up, this program teaches the basics of identifying trees by their leaves. For more information, call (828) 877-4423.

On Patrol

Editor's note: *Listed below is a report of a situation that exemplifies the always-unpredictable nature of a North Carolina wildlife enforcement officer's duty.*

Attempting to capture a fawn that had gained access to a fenced-in area, Wildlife Officer John G. Smith decided he would attempt to throw an old parachute (cast-net style) over the deer. Smith has used this approach several times in the past with great success. However, when the officer threw the net this time, he netted the deer and, unknowingly, a nest of extremely irritated yellow jackets. Smith has always excelled in 40-yard dash time trials, but this time he outdid himself. Both deer and officer came out of the fray unharmed.

2000 North Carolina Duck Stamp



Representatives of the *N.C. Wildlife Resources Commission accompany the artist of the 2000 North Carolina Duck Stamp painting. From left are commissioners Troy Boyd and Wes Seegars, artist Ron Louque and commissioners Arthur J. Williams and C.J. Belch Jr. The N.C. Duck Stamp painting is unveiled each year at the East Carolina Wildlife Arts Festival, held in Washington, N.C.*

Did You Know?

Nongame biologists with the N.C. Wildlife Resources Commission recently completed the installation of 450 nest boxes for northern flying squirrels, federally listed as an endangered species, at 45 sites scattered throughout the Black and Craggy mountains. Each winter for the next four years, biologists will check the boxes to determine if they are occupied by the squirrels.

KEN TAYLOR

Human Presence Affects Wood Duck Nesting

A project focused on the impact of high intensity, active recreation on nesting wood ducks is shedding light on some potential problems associated with wildlife and human interactions in parks.

A North Carolina State University study conducted through the N.C. Division of Parks and Recreation and Travel and Tourism recently discovered that some forms of active recreation, such as boating, hiking and fishing, can negatively impact wood duck nesting success.

The study was initiated to compare two areas with wood duck nest boxes and nesting wood ducks. One area was a high intensity, active recreation site at a municipal park, and the other site was located on property with restricted public access. The objectives of this two-year project were to compare wood duck nesting productivity from the two sites, and devise strategies to help park managers optimize public recreational opportunities and still allow successful wood duck box projects to exist.

The study revealed that nest boxes located near high traffic areas were tampered with, predator guards were removed and some entire boxes were removed from their poles. This severely lowered wood duck nesting productivity at this site.

In contrast, the nesting wood ducks at the site with restricted public access had much greater nesting success and efficiency, as well as higher overall nesting productivity and lower nest abandonment rates. There was no vandalism of any kind noted at this site.

MELISSA McGAW

***Wood duck boxes placed in** parks near areas of high human traffic experience far less nesting success than boxes in more remote locations. This finding is being used to develop strategies for promoting more successful wood duck boxes like the one above.*

Since wood ducks used the boxes at both sites, certain management recommendations were clearly needed to maximize wood duck production at park sites while still allowing for active recreation.

Recommendations included marking nest boxes with a sign denoting the importance of ongoing wildlife conservation work. In addition, interpretive displays explaining the wood duck box project at the park could be placed near high-visitor traffic areas. Literature could also be developed and passed out to park users explaining the wood duck box project. Also, park staff should be encouraged to carry materials with them as they patrol. Studies have documented that groups receiving educational information are less likely to destroy property on park sites.

—Laura K. White, park supervisor with the Hemlock Bluffs Nature Preserve

Gorges Inventory Charts Diversity

Only a year after they began, natural inventories of the Jocassee Gorges region are demonstrating what botanists and wildlife biologists have known for over a century—the rain-rich region harbors some of the greatest concentrations of rare species and natural communities in the mountains.

Since 1999, wildlife biologists and botanists have been scrambling up boulder-choked riverbeds and down shadowy gorges mapping significant natural communities and locating rare plants. This summer, other projects will begin, funded by grants from the Natural Heritage Trust Fund. Geologists will map the geological features of the area and wildlife biologists will survey populations of amphibians and terrestrial mollusks, timber rattler populations, small mammals and fish.

The region is located in southern Transylvania and Jackson counties. Almost 10,000 acres of land there were purchased from Duke Energy in 1998 to form the new Gorges State Park and provide additional acreage to the Toxaway Game Land, which is managed by the N.C. Wildlife Resources Commission. The properties adjoin more than 32,000 acres which were purchased from Duke by South Carolina.

Rainfall levels in the Gorges area approach 100 inches each year, feeding four major rivers and hundreds of waterfalls. The wet habitats of the region, along with its mild climate, nurture some of the rarest and most delicate plants, such as Oconee bells and the mosses, liverworts and ferns that grow in the waterfall spray communities.

Practical as well as scientific reasons have prompted the need for a thorough inventory of the Gorges area. The studies will help park managers protect the most important natural areas while enabling access to thousands of hikers, anglers, horseback riders and off-road vehicle users eager to take the measure of this wild land.

The inventories are expected to be completed in 2001.

—Lawrence S. Earley

Bald Eagles Expand Range

Three new bald eagle nesting territories have recently been discovered in North Carolina by Wildlife Commission biologists.

The territories were found in Burke, Pitt and Wilson counties. This brings the total of occupied and unoccupied bald eagle territories to 29 in North Carolina. Though the data is still preliminary, it appears that 30 eagle chicks have fledged from 18 active nests this year.

Once considered an endangered species, bald eagles have recently been upgraded to threatened. Wildlife Commission nongame biologists are hopeful the bald eagle may soon be taken off the Endangered Species List altogether.

—Courtesy of the Division of Wildlife Management

LEN RUE JR.

Federally Endangered Mussel Found

Wildlife biologists have discovered that the federally endangered Appalachian elktoe mussel has been found in the upper Pigeon River of Haywood County. Recent surveys by the Wildlife Commission indicate that in some areas of that river system, the species appears to be doing fairly well. In addition, a few individual wavy-rayed lampmussel were also found in the Pigeon River.

NORTH CAROLINA Wildlife RESOURCES COMMISSION

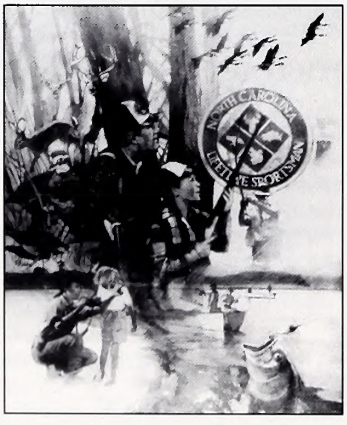
Catch Us at These Numbers

- **1-800-662-7137** to report violations of hunting and fishing laws.
- **1-800-628-3773** (NC VESSEL) for boat registration and titling.
- **1-800-675-0263** for hunting dates and shooting hours for migratory game birds.
- **1-888-248-6834** (2HUNTFISH) to purchase most licenses with VISA or MasterCard using a touch-tone telephone.
- **1-800-446-8663** (I GOT ONE) to report big game harvests.
- Connect to the Commission's online web site at **http://www.state.nc.us/Wildlife/**

The N.C. Wildlife Resources Commission maintains five toll-free telephone numbers to provide better services and convenient access to information for North Carolina citizens. Calls are answered in order, but some numbers may require a wait during busy seasons.

VISA MasterCard

Wildlife Endowment Fund Report



Totals Through April 2000

Principal Balance
$29,961,722.53

Interest Earned
$30,511,698.86

Total Receipts
$60,473,421.39

Interest Used
$18,580,819.04

Fund Balance
$41,892,602.35

Established on May 29, 1981, this fund is derived from the sale of lifetime hunting and fishing licenses and lifetime subscriptions to *Wildlife in North Carolina* magazine as well as from tax deductible contributions. While the interest may be used to supplement N.C. Wildlife Resources Commission programs, the principal remains invested to generate additional interest for the future.

Summer Projects

by Rodney Foushee

With the long days of summer upon us, here are some projects to improve fish and wildlife habitat on your land.

Planting Millet: To attract ducks to your beaver pond or impoundment in the fall, now is the time to begin planting Japanese millet. (Of course, first make sure you have drawn down the water level in the pond or impoundment.)

In the western part of the state, millet should be broadcast on moist exposed pond bottoms by mid-July. In the Piedmont and Coastal Plain, you can delay your seeding until Aug. 15. Your county Cooperative Extension Service agent can provide additional information on planting dates and seed suppliers in your area.

Your millet crop should mature in 60 to 90 days. And once flooded with 4 to 8 inches of water in the fall, the millet will provide an excellent food source for migrating waterfowl.

Pond Sampling: Now is an excellent time to sample your farm pond to determine if you have a balanced fish population. To start, you'll need a minnow seine 20-feet long by 4-feet wide with a 1/4-inch mesh. With the help of a friend, sample the shoreline with the seine at four or five locations and take note of what you find.

Don't be discouraged if all you catch is small fish—this is to be expected since most of the large fish will avoid the net. What's important is the relative size and species composition you find in the pond. Here are some possible results and their meaning:

- **Balanced population.** Young bass present. Many recently hatched bluegills. Few 3- to 5-inch bluegills.
- **Overcrowded bluegills.** No young bass. No recently hatched bluegills. Many 3- to 5-inch bluegills.
- **Overcrowded bass.** No young bass. Many recently hatched bluegills. No or few 3- to-5-inch bluegills.
- **Bluegills absent.** Young bass present. No recent hatch of bluegills. No 3-to 5-inch bluegills.
- **Undesirable fish population.** No game fish present. Few to many minnows, bullheads, suckers and shad.

If the pond is out of balance, you will need to change your harvest regime, or reclaim the pond and start over with restocking. For more information about pond management, contact your local Cooperative Extension Service agent or district fisheries biologist.

N.C. WILD STORE

Dazzling Butterflies

We've chosen a brilliant selection of rare and common butterfly species for our newest posters. Seventeen common butterflies and 19 rare species, in all their radiant color, adorn the posters. Range maps depict where each butterfly is found, and informational text highlights the connections between the butterflies and their habitats.

Common North Carolina Butterflies

What's the wing span of a Question Mark butterfly? Learn this and much more from this educational poster. 22" x 34". $8.
ITEM CODE **P15**

Rare North Carolina Butterflies

Learn why these species are considered rare or endangered. 22" x 34". $8. ITEM CODE **P16**

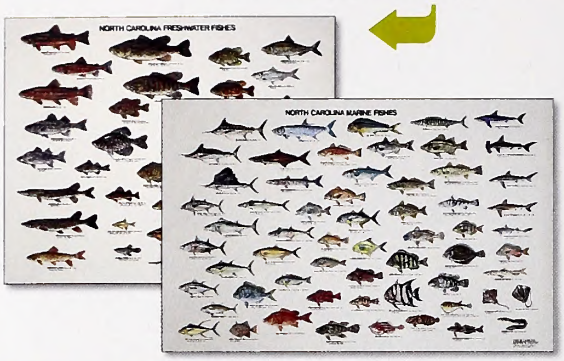
Butterfly Posters Set

Buy both posters and save! **$14.** ITEM CODE **P17**

All proceeds from the sale of these products support the development and production of conservation education projects and programs.

N.C. WILD STORE

North Carolina's freshwater fish and marine fish are colorfully displayed on individual posters, and feature the art of Duane Raver. Reel yours in today!



Fishes of North Carolina

Set of 2. Freshwater fish poster shows 36 state species (size 28" x 22 1/2"). Marine fish poster shows 60 species (size 35" x 22 1/2") $10.

ITEM CODE **P9**

Nature's Ways Collection

Explore the wonders of the natural world, wildlife species and ecosystems through "Nature's Ways." More than 200 essays from *Wildlife in North Carolina* have been compiled in a beautiful 6-volume paperback set. $27.50.

ITEM CODE **M9**

Also available as a boxed set. $30.

ITEM CODE **M10**

Before going on your next outdoor hike or camping trip, be sure you know North Carolina's reptiles.

Reptiles of North Carolina

Set of 4 posters in full color. Each poster decribes the species and denotes which reptiles are on the endangered, protected or special concern list. A set includes: lizards, turtles, and both live-bearing snakes and egg-laying snakes. Posters are sized 22" x 34". $18. ITEM CODE **P10**

Amphibians of North Carolina

The Hylid Frogs. North Carolina's tree frogs, cricket frogs and chorus frogs, belonging to the large family *Hylidae*, are presented in this colorful poster, one of two frog posters in the Amphibians series. 22" x 34". $6.

ITEM CODE **P11**

Amphibians of North Carolina

True Frogs and Toads. The second poster in the Amphibians series showcases true frogs and toads. Vibrant photos combine with informative text to make it a standout in the classroom or at home. 22" x 34". $6.

ITEM CODE **P14**

Waterfowl Decoys of N.C.

Nineteen classic waterfowl decoys from North Carolina's legendary days of waterfowl hunting have been collected for the first time on this framable, high-quality poster. This is the first in a series of "Sporting Heritage" posters. 22" x 34". $10.

ITEM CODE **P12**

Traditional Trout Flies of the Southern Appalachians

Sixteen traditional trout flies are presented in stunning color detail. Each fly is accompanied by a brief history of its development and use in Appalachian waters as well as the components that make up each hand-tied creation. Second in a series of "Sporting Heritage" posters. 22" x 34". $10. ITEM CODE **P13**

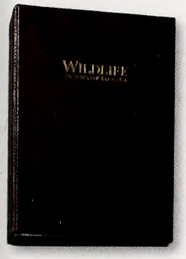
Bird Houses & Feeders: How to Build and Enjoy Them

An eight-page illustrated guide to building bird houses and feeders. $2.

ITEM CODE **M6**

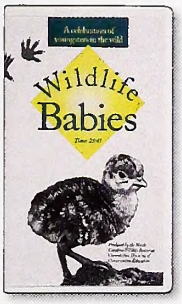
Dogs that Point, Fish that Bite

Here are 50 of the best "Our Natural Heritage" columns written by Jim Dean for *Wildlife in North Carolina* over the past 17 years. Published by the University of North Carolina Press and the N.C. Wildlife Resources Commission. 220 pages. Hardbound $19.95. ITEM CODE **M8**
Paperback $10.95. ITEM CODE **M12**



Magazine Binder

Store 12 issues of *Wildlife in North Carolina* in a sturdy binder. $10.
ITEM CODE **M2**



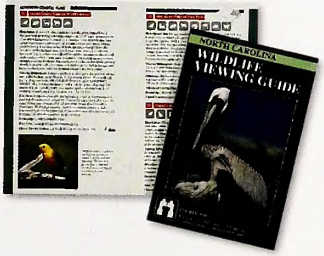
Wildlife Babies Video

Entertaining 25-minute video version of the classic 1965 Jack Dermid film reveals springtime antics of young wood ducks, black bear, possums, cottontails and others . $20.
ITEM CODE **N9**

Based on Chief Seattle's 1855 speech, the film's focus is on environmental ethics. Accompanied by This Land Is Sacred, this film is a must-see for everyone. It is destined to become a classic.

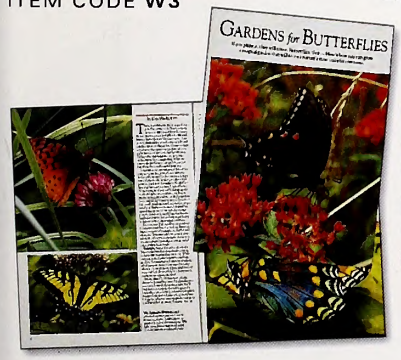
All Things Are Connected

Video and Activity Guide. $22.
ITEM CODE **W3**



North Carolina Wildlife Viewing Guide

From Cape Hatteras to the Great Smokies, *North Carolina Wildlife Viewing Guide* will lead you to 90 of the state's premier wildlife viewing locations—and better your chances of seeing wildlife once you get there. $5.95. ITEM CODE **N6**



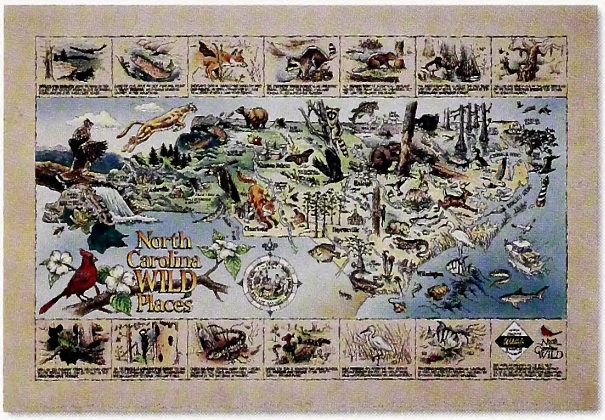
Gardens for Butterflies

Article reprint from *Wildlife in North Carolina* magazine for the gardener who wants to attract some of nature's most colorful creatures. $2. ITEM CODE **M5**

Scouting Correlations

Cub, Boy and Girl Scout requirements are correlated to Project WILD and Aquatic WILD activities. Supplements Scout leaders' planning materials and events. Each $3.
Cub & Boy Scout Correlation. ITEM CODE **E9**
Girl Scout Correlation. ITEM CODE **E10**

North Carolina's wildlife habitats come alive in this 82-page, easy-to-read, soft cover book. With delightful illustrations by Anne Marshall Runyon, N.C. WILD Places covers 13 habitats across the state.



North Carolina WILD Places: A Closer Look

Book and Posters Set. With each book you'll receive two habitat posters (also by Runyon) and a N.C. WILD Places Map poster, featuring the art of Jackie Pittman. $16. ITEM CODE **E6**

North Carolina WILD Places Teacher's Guide

For teachers using *North Carolina WILD Places* in the classroom, these activities and games will heighten student awareness of wildlife habitats. $6.
ITEM CODE **E7**

More terrific items

N.C. WILD STORE

N.C. WILDLIFE PROFILES BINDER & N.C. WILDLIFE PROFILES SETS 1-12

This top-quality 3-ring binder includes:

- 120 illustrated fact sheets, each profiling an animal's history, status, habitat and behavior, and also containing a range map.
- Tab dividers that organize 12 sets of wildlife fact sheets by class.
- A table of contents, index and instruction sheet.

$30. ITEM CODE **W17**

RIVERS OF NORTH CAROLINA

This 128-page special issue of *Wildlife in North Carolina* examines issues relating to North Carolina's rivers, from canoe trips to water-quality to the real-life stories of people working to save our rivers.

For timely coverage of all of North Carolina's river basins, as well as eye-catching photos and educational maps and graphics, there's nothing else like it on bookshelves anywhere. Order "Rivers of North Carolina" for your own bookshelf, or give it to friends and family members to enjoy. For $10, plus shipping and postage, you'll have a coffee-table edition that's already being hailed as a classic. $10. ITEM CODE **M11**

EMBROIDERED CAPS

North Carolina WILD Cap. N.C. Wild cardinal on brushed-cotton twill cap with a Velcro® closure. Two-tone cap is tan/forest green. $16.50. ITEM CODE **A1**

Wildlife in North Carolina Caps. Exclusive designs and magazine logo are featured on three different cap styles. $16.50 each.

- Brook trout on sage-colored, brushed cotton cap with an unstructured front, extended bill, and nubuck suede closure. ITEM CODE **A3**
- Deer silhouette on Advantage® Camouflage cotton cap with tan suede bill. ITEM CODE **A6**
- Deer silhouette on blaze orange cap with brown waxcloth bill. ITEM CODE **A7**

PISGAH CENTER FOR WILDLIFE EDUCATION T-SHIRT

100% cotton natural color tee with design on back and Pisgah logo on front. $14.50.

ITEM CODES:
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A8LRG (large)
A8XLG (extra large)
A8XXL (extra extra large)

NEW: WEE TEES

Just like the adult shirt with Pisgah design, only smaller.

ITEM CODES:
A9XS (extra small; size 2-4) $10.
A9SM (small; size 6-8) $12.50.
A9MD (medium; size 10-12) $12.50.
A9LG (large; size 14-16) $12.50.

WILDLIFE IN N.C. T-SHIRT

WINC magazine logo on front pocket. Tundra swan art on back. White. $14.50. ITEM CODES:
A5MED (medium)
A5LRG (large)
A5XLG (extra large)
A5XXL (extra extra large)

N.C. WILD T-SHIRT

N.C. WILD logo printed on front and colorful art on back. White. $14.50. ITEM CODES:
A4MED (medium)
A4LRG (large)
A4XLG (extra large)
A4XXL (extra extra large)

WILDLIFE COMMISSION SPOTLIGHT

Coming Soon: Mobile Aquarium

The N.C. Wildlife Resources Commission is expanding its aquatic outreach efforts by constructing a mobile aquarium that will be completed this fall.

Native species such as redbreast sunfish will be displayed in the Wildlife Commission's new mobile aquarium.

KEN TAYLOR

Plans are to unveil the mobile aquarium at the 2000 State Fair in Raleigh. The aquarium will feature two 300-gallon tanks, each with its own separate aeration, filtration and cooling systems. The separate life-support systems will enable the Wildlife Commission to display coldwater species in one tank and warmwater species in the other. The twin tanks will be permanently mounted inside the trailer and four different habitats will be constructed for the aquarium to provide a variety of natural-looking environments for different fish.

MELISSA McGAW

Plans are to unveil the aquarium (background) at this year's State Fair in Raleigh.

These habitats include a mountain stream, a coastal river, a farm pond and a reservoir. Funding for maintenance and operation of the mobile aquarium will come in part from the Sport Fish Restoration program, which receives its revenue from the sale of fishing equipment.

The mobile aquarium will be made available for regional fairs, trade shows, exhibits and other public events. For more information, contact the Division of Inland Fisheries at (919) 733-3633.

Peaceable Kingdom

A herd of white-tailed deer grazes contentedly in the Great Smoky Mountains National Park, where scientists and volunteers have begun an unprecedented effort to list and map the ranges of every living species in the park. See page 8 for story.

Periodicals postage paid at
Hickory, North Carolina

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WILDLIFE IN NORTH CAROLINA

AUGUST 2000 $1.50

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A Mere Shell of Itself

by Jim Dean ©2000

KEN TAYLOR

"I don't recall hearing any theories that explain the lack of shells on beaches these days, but I doubt that the causes are purely natural."

It took more than a year to clean out the house after Dad moved into a rest home. Whenever there was an opportunity, my brothers Graham and John and I would spend a few days gradually dismantling memories, reluctant at first to throw away even the most trifling item. Except for countless boxes, full and ready to be packed away, only the beds where we slept remained when we made the last two or three trips. Then, in March, we went one last time to finish up. As anyone who has performed this sad chore will tell you, it is crushing work both physically and mentally. Every time we thought we could see the end of it, we would discover some overlooked trove, a closet half full of clothes, old toys tucked under the eaves, a storage room packed with garden tools and—odd only if you didn't know Dad—dog collars from more pointers and setters than any of us could remember. When I moved the vacuum cleaner in the pantry I found the boxes of seashells.

"What are we going to do with these?" I asked.

There was no immediate answer. We simply sat down on the floor, tasks forgotten. The biggest box contained large whelks, an elegant murex, a horse conch nearly two feet long and a massive helmet shell bigger than a cantaloupe. Another box held smaller knobbed and channeled whelks, Florida fighting conches, Scotch bonnets and banded tulips—all in perfect condition.

John carefully extracted a large, fragile tun shell, another murex and a double sunray Venus. "Mom and Beth and I found these at the scallop factory back in the '70s, and some came from Shackleford Banks, too."

Other boxes contained smaller shells layered in paper towels like calcium lasagna. We were not surprised to find that we still knew all their common names even though we had not seen such shells on beaches in years. Mom had spent hours gluing our discoveries to framed shadow boxes that hung in all the rooms of the cottage.

Finding those shells was an unexpected pleasure, a wistful interlude that carried each of us back to times we would never know again.

"Let's take them to the cottage and display them," Graham suggested. "We might even want to mount some of them in frames. For certain, our kids and grandchildren won't find shells like these nowadays. I still like to look, but I don't find much."

It's true. On popular beaches that once yielded countless shells, you are fortunate to find anything more interesting than a calico scallop, Atlantic cockle, turkey wing or the random olive shell. Certainly, you don't find many fragile or uncommon shells and a large, perfectly intact whelk is virtually unheard of.

I don't recall hearing any theories that explain the lack of shells on beaches these days, but I doubt that the causes are purely natural. It apparently takes a long time—many years perhaps—for waves and grit to grind a shell to sand. Although storms may wash in a new supply occasionally, intact shells—especially larger ones—tend to lie on the surface exposed for inspection by everyone who ambles past. I suspect that casual shell collectors have simply cleaned our popular beaches over time. The fact that remote beaches still have some shells supports this notion, but even those places are visited more regularly than they were 30 years ago.

In the 1970s, I had a chance to visit a virtually unpicked beach when a group of wildlife educators gathered at Charleston, S.C., for a conference. We were taken by boat to nearby Capers Island because it was the site of an early experimental release for red wolves. We didn't see any wolves, but I spent several hours on the wildest beach I've ever set foot on. You could barely walk without stepping on gorgeous shells of every imaginable type. You could have filled a wheelbarrow with the whelks, murex and helmet shells in any 50-foot stretch. We were told that this barrier island did not get many visitors except for the occasional fisherman, and I have since wondered whether Capers Island is still a shell paradise.

I picked up only one shell that day. I could not bring myself to keep more. Perhaps my brothers and I ought to put all our shells back on the beach, but I doubt they'd last through the morning. Mom would have been out there at daylight.

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WILDLIFE IN NORTH CAROLINA

Wildlife in North Carolina is the official educational publication of the North Carolina Wildlife Resources Commission. It is dedicated to the sound conservation of North Carolina's wildlife and other interrelated natural resources and also to the environment we share with them.

August 2000 *Volume 64, Number 8*

FEATURES

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written and photographed by Harry Ellis ©2000
North Carolina's spiders are a diverse collection of hunters, trappers and even some anglers whose predatory skills are awesome.

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10 **King of the Bottom Fish**
written and photographed by Joel Arrington ©2000
With its bulging eyes, sharp teeth and flat body, the flounder could be described as downright ugly. Take a bite of a fried flounder fillet, however, and you'll know why no one runs from these fish.

14 **Friends, Feathers and Fun** *written by Chris Powell*
Looking forward to dove hunting next month? Before you go, check out these dove fields managed by the Wildlife Commission.

16 **Touring the Cherohala Skyway**
written by J. Dan Pittillo ©2000
Remote southwestern North Carolina arguably contains the state's most spectacular mountain vistas, and some of its most hallowed natural heritage sites.

22 **Little Alligator Summers** *written by Jim Dean* ©2000
illustrated by Chris Armstrong ©2000
Day after bright day, it was the same. Breezes through the screens, the slap of water under the cabin floor, the hot buzz of insects in the marsh and long sunsets until bedtime.

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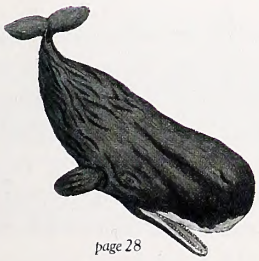
DEPARTMENTS



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Cover *This camouflaged crab spider awaits its prey atop a black-eyed Susan. Photograph by Harry Ellis.* ©2000

Wildlife in North Carolina (ISSN 0043-549X) is published monthly by the North Carolina Wildlife Resources Commission, 512 N. Salisbury St., Raleigh, N.C. 27604-1188. Periodicals postage paid at Raleigh, N.C. and additional mailing offices. Subscription rates: one year $7.50, three years $20, lifetime $100. All foreign subscriptions are $23.50 per year. For subscriptions from foreign countries, payment **only** by U S Postal Service money order or cashier's check drawn on a U.S. bank. All orders must be prepaid. Please allow 6 to 8 weeks delivery on new subscriptions and address changes. **POSTMASTER:** Send address changes to Circulation Manager, 1711 Mail Service Center, Raleigh, N.C. 27699-1711. Address all correspondence regarding subscriptions to Circulation Manager. If you have a problem with your subscription, dial (919) 662-4377. Articles in *Wildlife in North Carolina* may represent the personal views of authors, and do not imply endorsement by the North Carolina Wildlife Resources Commission. *Wildlife in North Carolina* is available on audio cassette as a courtesy of volunteer services of the Department of Cultural Resources, Library for the Blind and Physically Handicapped, Raleigh, N.C., (919) 733-4376. **The N.C. Wildlife Resources Commission is an equal opportunity agency.**

Two Worlds, One Fish

written by David S. Lee ©2000
illustrated by David Williams

In the salt marsh there are only scattered places that are more than a few inches above the reach of high tide, and fewer yet that are not exposed when the tide is out. The rich green expanse of windswept cordgrass is irregularly broken by dark islands of black needlerush. From ground level, the marsh seems an unmappable maze of tidal creeks that twice daily flood the low marsh with brackish water and twice daily become channels of exposed gray mud. There is no protective overstory; only grasses emerge from a world that at one hour belongs to the harsh extremes of the summer sun and at another to the sea.

The inhospitable nature of this habitat confronts all marsh organisms with some of the most physical extremes found in any biological community. Twice a day, the marsh soil is alternately inundated with very salty water and left high and dry, exposed to the searing heat of the sun. The animals live here under the terms of a genetically signed contract with the marsh, and their daily activities are dictated by the synchronized cadence of the salt-laden tides. Not surprisingly, perhaps, many marsh creatures have been forced to develop amazing specializations that enable them to adapt to these extremes. Their coping skills are as varied as the animals themselves, and some of their survival techniques would surprise you.

The mummichog's, for example. The mummichog is one of a number of killifish species that live in the upper tidal areas of salt marshes from Canada to Georgia. Because of its choice of habitat, the fish has been forced to develop remarkable tolerances for physical stresses that include acidic conditions, hypersalinity and high temperatures that range from 33° to 85° F.

But it's the mummichog's ability to survive out of water that is its most curious adaptation. Because it lives high in the marsh it often becomes stranded by the retreating tides in small shallow pools that continually shrink in size. It's not a good situation for a gilled creature. As the pools shrink, the fish is exposed to oxygen depletion, drastic temperature changes and salinity fluctuations. The mummichog's solution is to go into hiding, leaving the pool and seeking out marsh grass or any other place that offers shade and protection.

These extraordinary fish have no air-breathing organs. Instead, they rely on their skin, gills, the linings of their mouths and opercular cavities to take in oxygen and eliminate carbon dioxide. Studies have shown that they can live out of water for over an hour and a half, and that gas exchange is more efficient at higher air temperatures than at cooler ones. This works well, for at cooler temperatures the water holds more dissolved oxygen and it may not be necessary for the fish to vacate the pools. The carbon dioxide and oxygen exchange is similar to that of air-breathing terrestrial vertebrates. The volume of oxygen used is lower than what the fish normally use in water, but it is enough to keep the fish alive.

The mummichog's ability to live out of water by breathing air is a big step. It enables the fish to survive the brief periods when the tides are at their lowest and when the pools in which they would otherwise be forced to live are devoid of oxygen. If they remained in these pools, even for short periods, they would quickly suffocate. By breathing air they can get through the brief period before the incoming tide brings oxygen-laden waters back into the tidal creeks. Because of this air-breathing behavior, the mummichog is able to remain in and exploit the uppermost reaches of the salt marsh, giving it a competitive advantage over estuarine fishes with more traditional habits.

It is true that aquatic creatures began to move onto land in the distant past, when terrestrial vertebrates first evolved, yet this process is still going on. The mummichog is only one of many species of aquatic animals currently making a living in a transitional world. It can survive for extended periods out of water, but don't expect to see it in pet shops shopping for fish food any time soon.

David S. Lee is the curator of birds at the North Carolina State Museum of Natural Sciences in Raleigh.

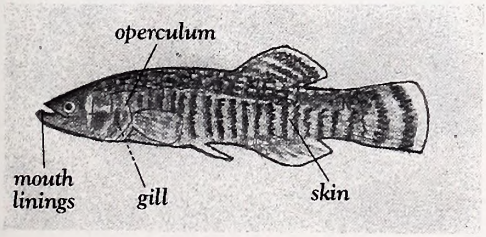
Other Reading:

- John and Mildred Teal, *Life and Death of the Salt Marsh* (Ballantine Books, 1969).

Surfing the Web

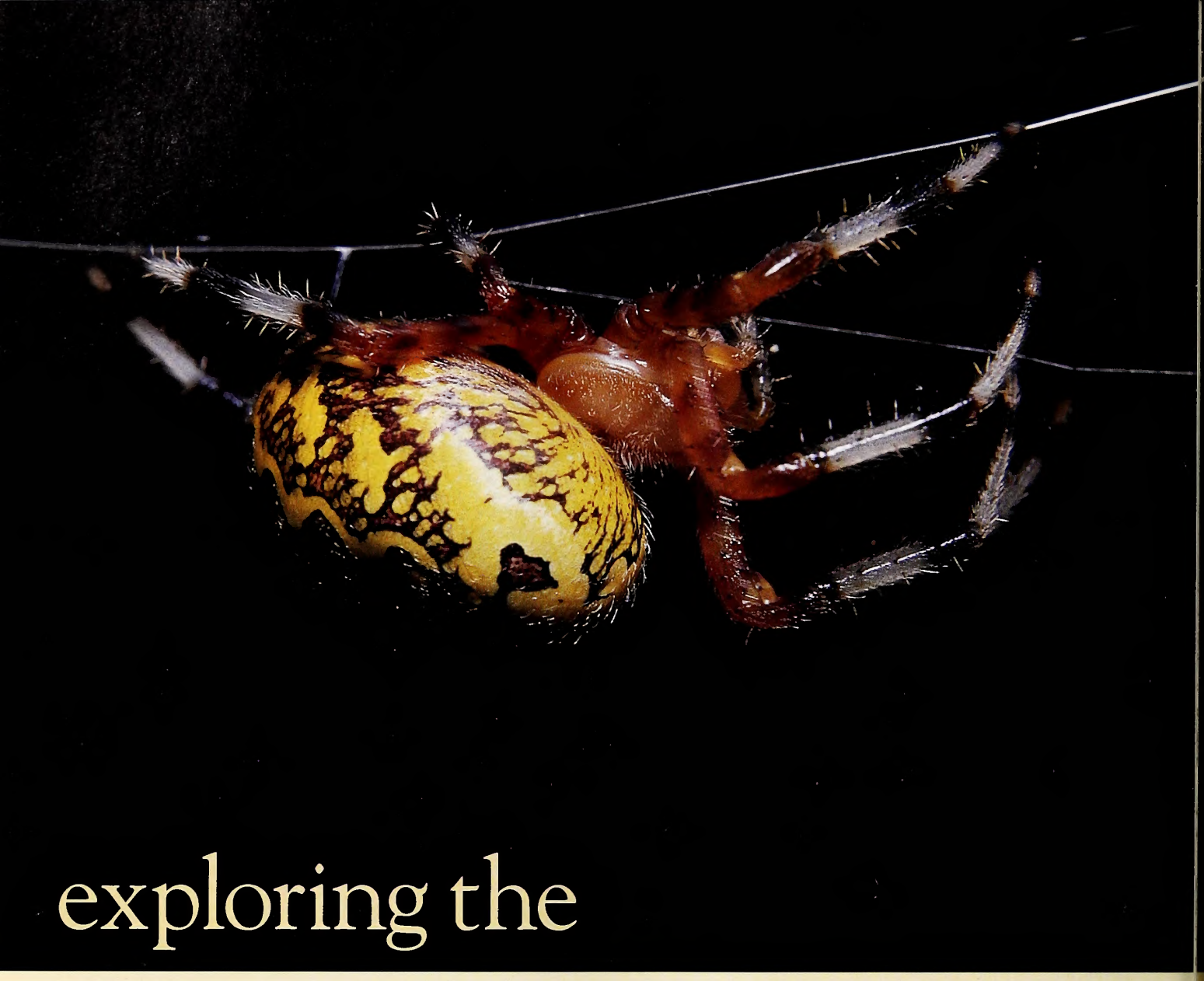
- For more information on the mummichog, see the site for Cornell University Cooperative Extension 4-H Natural Resources program. An image of the mummichog can also be downloaded from this site. *Address:* http://www.dnr.cornell.edu/Sarep/fish/Cyprinodontidae/mummichog.html Also see Kidsweb site. *Address:* http://www.savebay.org/kidsweb/about_the_Bay/inside_mummichog.htm
- For detailed information on marsh ecology, see parts 1, 2 and 3 of "Tidal Wetland Ecology of Long Island Sound." *Address:* http://camel2.conncoll.edu/ccrec/greennet/arbo/publications/34/CHP3A.HTM

The mummichog is a small killifish with an amazing adaptation to its salt marsh habitat. Because the little fish inhabits the upper reaches of the marsh, retreating tides can leave it stranded high and dry, but it can survive out of water by breathing air.



Though mummichogs have no organs for breathing air, they can take in oxygen through their skin, gills, operculum (gill covering) and mouth linings.

Because of its ability to survive a stranding, mummichogs can exploit the uppermost reaches of the salt marsh, giving it an advantage over species without this ability.



exploring the SPIDER'S WORLD

NORTH CAROLINA'S SPIDERS ARE A DIVERSE COLLECTION OF HUNTERS, TRAPPERS AND EVEN SOME ANGLERS WHOSE PREDATORY SKILLS ARE AWESOME.

written and photographed by Harry Ellis ©2000

To many people, spiders are the most feared, abhorred and misunderstood of Nature's small creatures, often bringing terror to the stoutest of hearts. On the other hand, a genuine fascination with spiders and their amazing instinctive skills touches just as many thousands, both scientists and laymen. Countless billions of spiders surround us, outnumbering us beyond all calculation. Our backyards, woods and meadows are full of them. Personally, my interest in the spider clan is boundless. To study and photograph them, I have climbed our most rugged southern mountains and endured the torture of clouds of annoying mosquitoes in swamps and lowlands.

Spiders belong to the order Araneae, with more than 35,000 known species worldwide belonging to more than 60 different families. About 3,000 species are found in North America, approximately half of which are represented in North Carolina. Many authorities agree that most of the world's spider species are still awaiting discovery and classification.

Spiders differ from insects by having eight legs instead of six, only two distinct body divisions instead of three as in insects, and usually eight eyes. They use venom from poison glands to immobilize their prey and for self-defense, and though a few species are dangerous to man—sometimes even deadly—most are harmless, except to smaller insects.

The spider is a master at silk spinning. Inside its abdomen are five or six silk glands, each secreting a particular kind of liquid silk, enabling it to produce a variety of silken threads to fit its every need. The spider's hindmost pair of legs pulls the silk from a cluster of nozzled jets at the tip of the abdomen, called spinnerets. When exposed to air, it becomes the tough, elastic strands of spider silk with which we are familiar—stronger than a steel wire of the same diameter. In general, the web-spinning is done by the female of the species.

Because spiders devote their entire lives to snaring, capturing and devouring insects, they should be considered true friends of humans. Spiders either hunt or trap their insect prey, depending upon the spider species. The trappers devise a diabolical array of silken nets and snares to entangle their victims. The hunters, on the other hand, construct no traps or webs but actively prowl about in search of prey or wait in ambush, relying upon their speed, keen eyesight and strength.

Hunting spiders include the wolf spiders of the genus *Lycosa*, large hunters that live on the ground and hunt at night, chasing and springing upon their victims with the savagery of wolves. The female drags her silken egg sac behind her, attached to the spinnerets, with an affection so strong for the eggs, and later for the young, that she will fight to her death to protect them. After hatching, the baby spiderlings climb on their mother's back and are carried about with her over the roughest terrain for a week or more. Then, one by one, they venture off.

With eyes that resemble headlights and the sharpest vision of all spiders, jumping spiders (family Salticidae) stalk their prey in broad daylight, much like a cat stalks a mouse. They approach slowly until they are some distance away, then make a sudden pouncing leap, sometimes jumping more than 40 times their own body length. Before leaping, each spider anchors itself with a silken dragline to prevent itself from falling, just as a human rock climber does with a safety rope.

Many species of crab spiders (family Thomisidae) hide themselves in flowers and wait in ambush for the arrival of nectar-seeking insects. One of our common species, *Misumena vatia*, and several closely related species have the ability to change their colors to match the colors of the blossoms in which they have taken residence. Equipped with an extremely potent venom for flying insects, these small arachnids fearlessly attack and kill wasps, large bumblebees and butterflies—insects much larger than themselves—and suck their bodies dry.

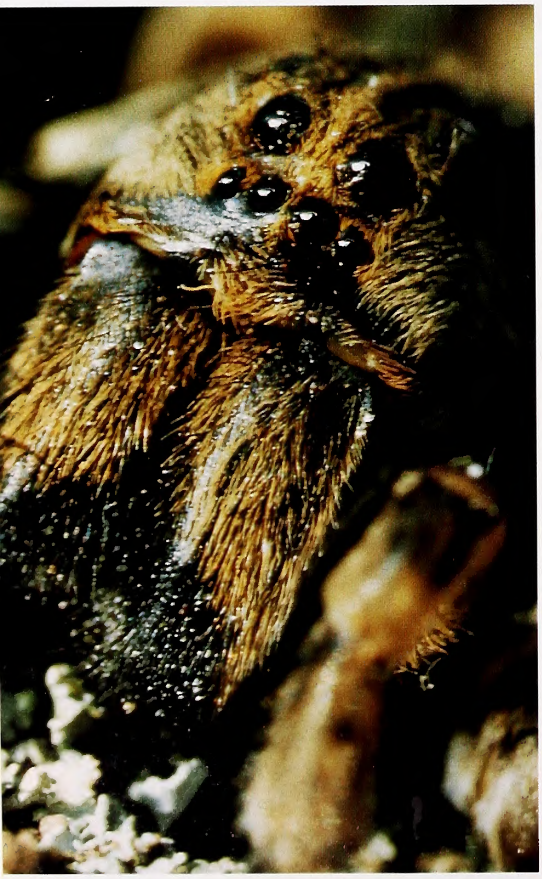
In an outstanding example of maternal devotion, the female nursery-web spider (*Pisaurina mira*) carries her great silken egg sac in her mouth until just before hatching time. She then hangs it in a suitable place, ties green leaves together with silk to form a nursery tent for the forthcoming young, and, defiantly straddling the nest, guards it against all intruders.

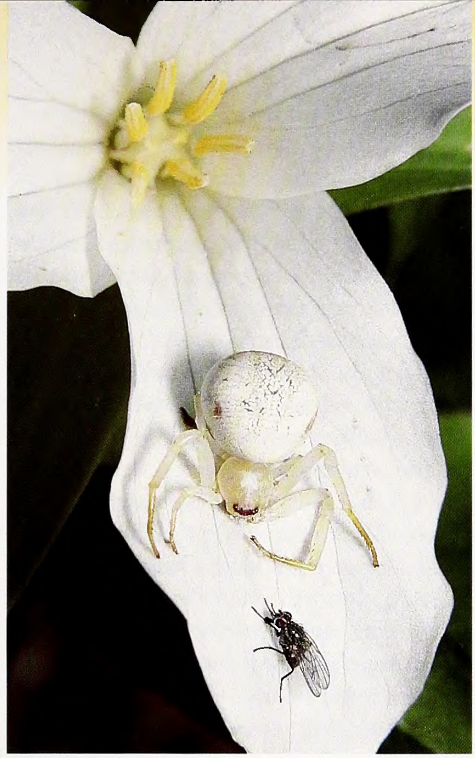
Strangest of all the hunters are the large, keen-eyed fishing spiders of the genus

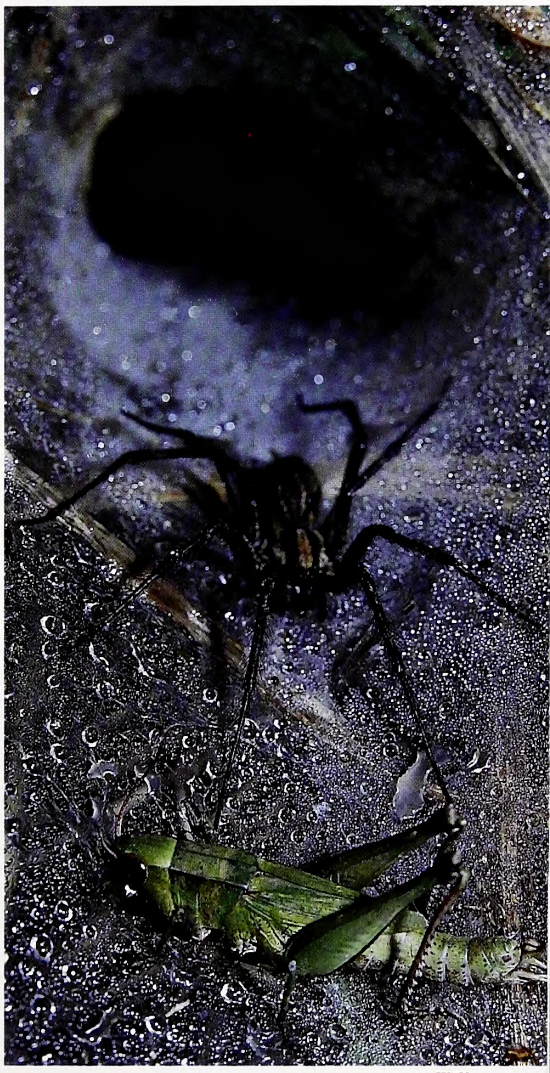
With a "telegraph" *line attached to its web, the marbled orb weaver (facing page) can feel any vibration caused by would-be prey. To catch its prey, the crab spider (below) has changed its color to blend in with a yellow ladyslipper.*

HUNTERS & TRAPPERS

***Despite their miniature** size, spiders are some of the most ferocious and cunning predators in the natural world. Hunting spiders (indicated by dark brown arrows) employ a variety of tactics to find food. The wolf spider (below) uses its acute vision to stalk and kill its prey. The fishing spider (right), after catching its minnow prey, uses special enzymes to dissolve it so it can be easily digested. The crab spider about to pounce on the fly (top, page 7) camouflages itself by changing its color to match its background. Trapping spiders (indicated by light brown arrows) use an amazing variety of webs to ensnare their prey. The Appalachian cliff spider (middle, page 7) waits inside its circular web for its prey, while the grass spider (top right) hides in its tunnel web and emerges to kill a struggling grasshopper. A spiny bodied spider (bottom right) is another orb weaver with distinctive spines on its abdomen.*







Dolomedes. Amphibious by habit, this spider is at home in two environments, able to run gracefully over the surface of the water snapping up insects and also, on occasion, to dive beneath the surface and capture small fishes and tadpoles, thus becoming Nature's smallest angler. Like all spiders, it injects venom and also a powerful digestive enzyme that liquefies the body contents. Whether its prey is an insect or a minnow, the spider uses its fangs as drinking straws, literally "drinking" the victim.

The only common species of trapdoor spider found in the Southeast is *Ummidia adouini.* This trapdoor species builds its silk-lined, almost horizontal tunnels, with wafer-like hinged doors, in the sides of steep banks.

Another very agile long-legged hunter is the green lynx spider (*Peucetia viridans*). With a bright, transparent green body, it is one of the most strikingly beautiful of all spiders. It lives in green leaves and low vegetation, where it chases its prey during the daylight hours, and its green coloration blends so perfectly with the background that the spider frequently escapes detection.

Most amazing of all are the master trappers of the spider world, that devise an ingenious variety of complicated traps as snares for capturing their prey. In addition to the familiar orb web, there is the flat, silken sheet of the grass spider (*Agelenopsis* spp.) that tapers to a funnel-shaped retreat—the "perilous parlor"—where it waits to invite "guests" inside. The bowl-and-doily spider (*Frontinella communis*) fashions a silken bowl and, just below it, a flat sheet—the doily—with the spider hanging under the bowl awaiting its prey. The curious snare of the Appalachian cliff spider (*Hypochilus thorellii*) is hung under dark ledges and cliffs in remote areas of the Southern Appalachians. The spider hangs upside down in the lampshade-shaped web, waiting for prey. The purse-web spider (*Atypus milberti*), a close relative of the tarantula, extends its silken tube from a silk-lined burrow up the side of a tree for several inches. When an insect lands on the tube, the waiting spider bites through the silk and pulls the victim inside. Then there is the cobweb weaver, the Ameri-

Covered with *hundreds of glistening webs built by bowl-and-doily spiders, this meadow looks like a fairyland in the early morning light.*

can house spider, which hangs its haphazard tangle of threads in the corners of houses, bringing out the brooms and the wrath of fastidious housewives.

Only two American spiders are dangerous to man. Foremost is the black widow (*Latrodectus mactans*); the female is a shiny black spider with a red hourglass design on the underside of the abdomen. Abundant in many areas, it is found around trash heaps and piles of wood and in old, abandoned buildings. Only the females bite humans, but they are normally not aggressive, except around their eggs or young, when they are particularly dangerous. Drop for drop, their venom is about 15 times more virulent than rattlesnake venom, but the bite is rarely fatal to humans because of the minute amount injected. After mating, the female often eats the much smaller male, earning her common name. Our only other poisonous spider is the brown recluse (*Loxosceles reclusa*), sometimes called the violin spider for the violin-shaped marking on the cephalothorax. Found in houses, it bites when disturbed, producing a wound that is slow to heal.

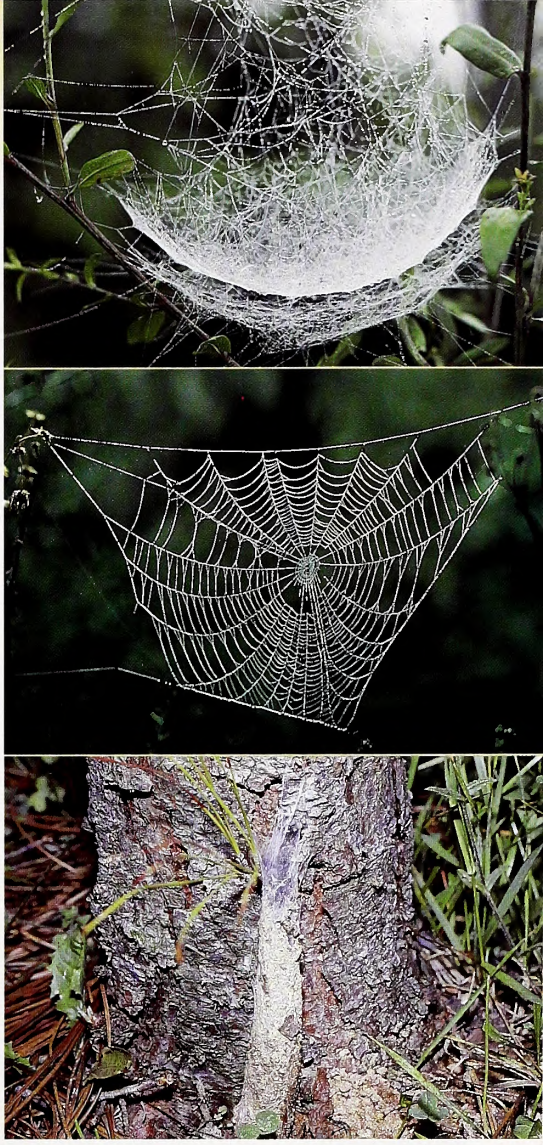
The wheel-like orb web, with its dry, nonsticky spokes (or radii) and sticky, insect-catching spirals, represents the pinnacle of engineering achievement among spiders. The orb-weavers are endowed with abilities and skills that seem almost intelligent. The spider appears to "know" what the finished web will be like and exactly how to make it, proceeding from one step to the other as if it carried a whole complicated blueprint in its mind. It is well known, however, that instinct plays a major role in every act of a spider's life. The spider is born knowing all it will ever need to know for the performance of its normal activities.

Though they see poorly, these spiders spin their webs by touch in the darkness of night, completing the entire web in approximately an hour. Some species construct a new web almost every night.

Since ancient times, the orb web has been a symbol of the spider in the mind of man. The dew-laden web of dawn is nature's own necklace, bedecked with her best jewels, captivating poets, philosophers and naturalists alike. But to an insect it is a death snare, and to the spider it is a means of avoiding hunger. Overall, it is an essential part of Nature's great ecological web, where nothing lives or dies unto itself.

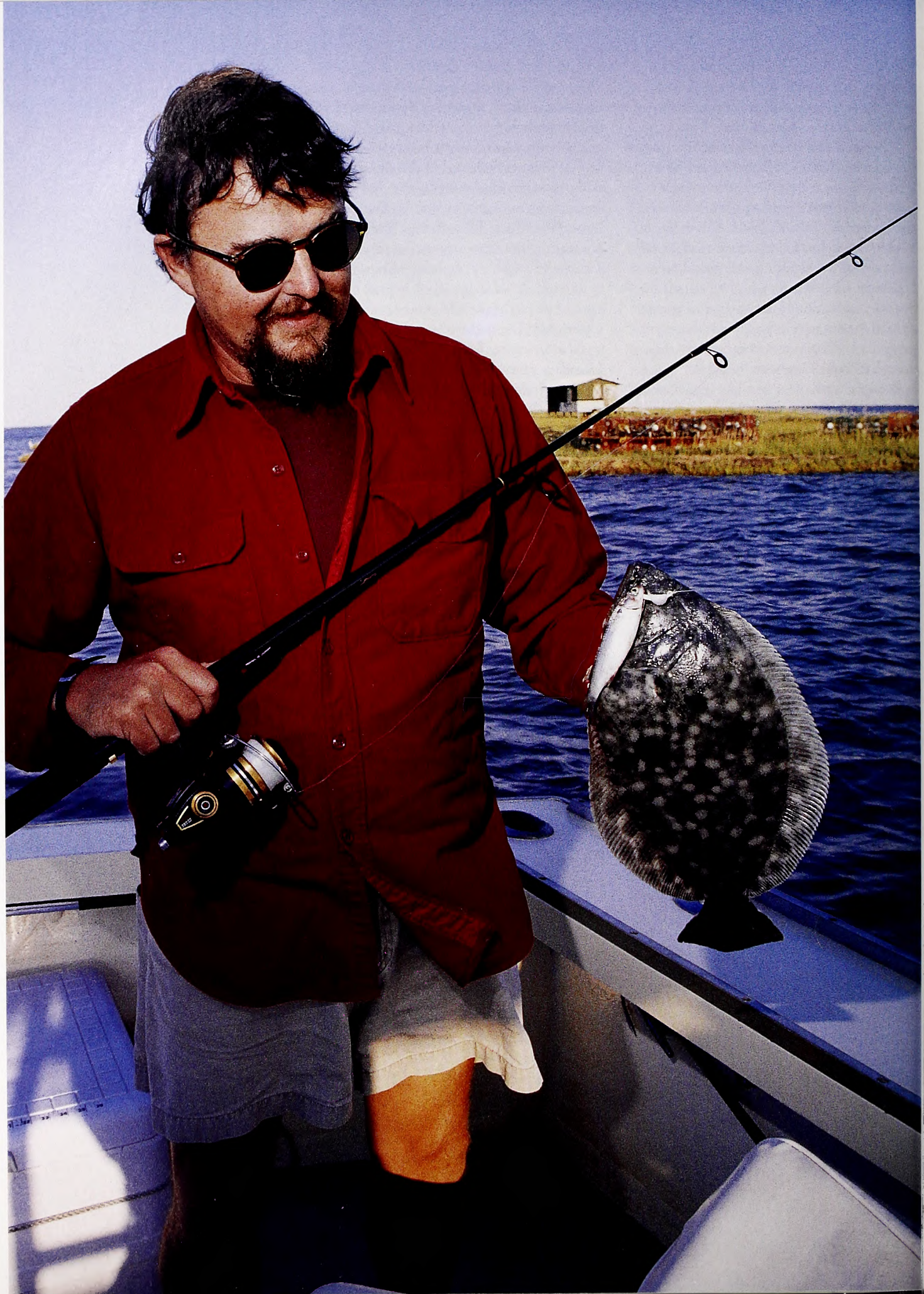
From the center of their hug orb wheels, the large, conspicuous black-and-yellow argiope, or garden spider (*Argiope aurantia*), and the banded argiope (*Argiope trifasciata*) hang head-downward waiting for a vibration of insect claw or wing, informing them that the web has done its deadly work. The handsomely marked marbled spider (*Araneus marmoreus*), along with others like the shamrock spider, builds its retreat by weaving leaves together, just above its web. Then it strings a "telegraph" line from the center of the web to the retreat. Retiring to its sanctum, the spider waits, with a front leg holding the single line, like a fisherman awaiting a bite. With a marvelous sense of touch, it feels every vibration of its silken universe, and when the "telegraph" announces that something has landed, it hurries out to investigate.

Soon after hatching, young spiders of many species disperse across the landscape by "ballooning." Each spiderling climbs to the tip of a twig or fence post and plays out a long line of silk into the wind, allowing itself to be carried through the skies to whatever destination chance may take it, perhaps to some more favorable distant meadow. Sometimes you can see hundreds of these airborne aeronauts against the blue of the sky, their gossamer parachutes glinting in the sun.



Three masterpieces *of web design: the bowl-and doily-web (above); the familiar orb web (middle), constructed by the garden spider; and the tube web of the purse-web spider.*

With the end of summer and the onset of autumn, the activity of spiders comes to a halt. Most orb-weaving spiders die in the first frost of the fall, after the females have hidden their eggs safely away in silken sacs or have left to the world an overwintering brood of youngsters. Many spiders among the hunting groups live more than a year, sometimes several years, especially the larger wolf spiders, purse-web spiders and trapdoor spiders. Both adults and young of many species hibernate in safe and cozy places, away from winter's howling winds and ice and snow, thereby bridging the gap between the falling leaf and the budding leaf. ⊠



With its bulging eyes, sharp teeth and flat body, the flounder could be described as downright ugly. Take a bite of a fried flounder fillet, however, and you'll know why no one runs from these fish.

written and photographed by Joel Arrington ©2000

Anyone who likes to eat fish at all enjoys a flounder. Its mild, white flesh and low oil content suit the taste of those who wouldn't care for, say, a gray-fleshed, oily bluefish. Gourmets respect the flatfish as a vehicle for delicate sauces. Indeed, a thin, tapered fillet broiled and topped with hollandaise remains for many the definition of seafood.

Demand in the marketplace makes the flatfish species collectively among the most valuable finfish products. North Carolina fishermen alone harvest upwards of $15 million worth annually. A large percentage of coastal anglers pursue these fish on foot and from boats only partly because of the flounder's reputation on the table. Catching one accidentally is easy; it happens frequently to nearly everyone fishing in the coastal zone. But to target them and catch them regularly require a set of tactics that has to be learned and carefully applied.

North Carolina has three species: summer flounder (called "fluke" in the northern states), southern flounder and a minor species, the Gulf flounder. Summer flounder—the most abundant by a large margin—prefer higher salinity, so most are caught in the ocean. But only anglers who have made a point of learning the differences among the flatfishes can distinguish one from the other. We fish for all of them the same way, if not in precisely the same places.

Flounder anglers tend to fall into two schools—those who fish with bait and those who use artificial lures. Nothing, however, says you can't fish both ways, tipping a jig with a strip of squid or a minnow. But fishing live baits can present problems, though not insurmountable ones. You've got to catch or buy these baits and then you've got to keep them alive. Yet many anglers believe they catch bigger flounder on large live baits, so they will go to great lengths and tolerate many inconveniences to fish them.

Capt. Jimmy Price, of Oak Island, is not a live-bait fisherman. For more than 30 years, he has been guiding and teaching folks how to fish for flounder with artificial lures. He uses mainly 5/8-ounce bucktail jigs, sometimes tipped with squid or artificial strips, and always tied directly to the line without a leader. This lure, he says, is just about right for depths between 2 and 16 feet.

"Cast the jig into the tide and let it sink to the bottom," he says. "Then jump it along the bottom in 6- to 18-inch hops, but don't lift it more than a foot high. That'd take it out of the strike zone."

King OF THE Bottom Fish

For the bottom fisherman, *few catches cause as much excitement as the flounder. With its wide, flat shape, a flounder is practically a fillet with fins.*

Price fishes 8-pound test line as a rule, but caught his biggest flounder on 6-pound test. The fish weighed 17 pounds, 6 ounces.

Flounder settle into the bottom material with only their eyes emerging so that they can ambush bait. Price prefers to anchor and cast to structure rather than drift or troll.

"Rock piles, docks, pilings, seawalls, wrecks, artificial reefs—anything like that on the bottom," he says, "will likely produce bigger fish than drifting."

He advises casting back to the same location where you hook a fish, because often numbers of flounder will lie close together. Though a long drop-back is recommended when fishing live bait, Price says that when a flounder hits a lure, "usually on the fall," the angler should set the hook instantly.

In the Southport area, the flounder season may begin in April, but Price says the fish are likely to be small then, mostly under the legal size. The season really starts in May and continues through November. That's generally the case across the state.

"In July and August," he says, "fish move into the ocean out to 35 to 40 feet of depth. By September things begin to cool down and they move back inshore." Ideal water temperatures, most veterans agree, run 68 to 72 degrees.

George Summerlin, an Atlantic Beach flounder expert and fishing instructor, says novice anglers should start with bait.

"Fish off a dock for spot, pinfish, hogfish, black bass—almost anything," he says. Summerlin usually catches a variety of small fish but warns that croaker and trout do not make good flounder bait.

"Finger mullet are good, but you can't catch them on a hook," he says. "Buy them from a bait shop or catch them with a cast-net." Larger mullet can be cut into strip baits but must be salted to stay on the hook. Summerlin also recommends catching your own mud minnows in a trap. These hardy minnows, kept in a trolling bucket or livewell, will often outlive other live baits during the heat of the summer.

Baitfish feed up into the shallows at night and begin to drop back to deep water at daylight. Since flounder follow the bait, Summerlin recommends starting in shallow water at dawn and fishing progressively deeper as the day wears on. Fish will seek greater depths in the warm months. The depth at which you find fish usually depends on water temperature and the time of day. At midday, flounder will lie in the deepest channels. In Bogue Sound, for example, that might be 15 to 20 feet at most. Regardless of the depth, Summerlin uses a 2-ounce bank sinker and 15-pound test line. A good fisherman always notes the depth at which flounder are caught to set up another drift over the same depth.

Summerlin also recommends using soft-tip rods and letting plenty of line out to reduce lift off the bottom. When the flounder takes, he says, give it ample drop-back.

"Most people must train themselves to give the fish line on the strike," he says. "It's impossible to drop back too much."

He recommends holding the rod at all times, because if you put it down and develop too little slack line, the rocking boat may lift the bait off the bottom.

Terminal tackle for bait fishing includes standoff rigs—wire stiffeners to hold monofilament droppers perpendicular to the line. Summerlin uses 3/0 bait hooks and a bank sinker. The sinker's round shape permits it to roll with the bottom contours. A simple live bait rig made with an egg sinker, a barrel swivel and a 12- to 18-inch monofilament leader tied to a Kahle-style hook also works well for flounder. Choose egg sinkers between 1 and 2 ounces to make sure you keep contact with the bottom.

Ideally, you want your baits to work along a channel edge. In Bogue Sound, a northeast wind is good. Water clears on a north wind there, but it also blows across the channels, when you want to drift along them. Summerlin fishes along the contour between a shoal and a deep channel. High winds can be a problem because they muddy the water and accelerate the drift. In flounder fishing, you want clear water and a slow drift. Summerlin says the ebb is not necessarily better than the flood. He recommends any stage of the tide as long as it's moving.

Summerlin likes the ocean side of Shackleford Banks, running up into the lee and drifting out. Generally he fishes inside the barrier islands in summer and moves to the ocean on northeast winds after Labor Day.

"Heavy boat traffic on summer weekends makes flounder fishing almost impossible here," he says.

Whether anglers prefer artificial lures or bait—or a combination of the two—flounder fishing continues to entertain countless sportsmen and women across the North Carolina coast. Although even large flatfish will not test tackle like some of the salty speedsters, they offer their own special challenge and their own special reward. ⊠

Many anglers *use Fluke Killer rigs (shown above) in place of standard bottom rigs to fish for flounder. The rig consists of a 3-foot leader fished behind a weight with a bucktail-type skirt that slides down over a single hook. It is fished on the bottom from a drifting boat.*

The Scoop on Flounder

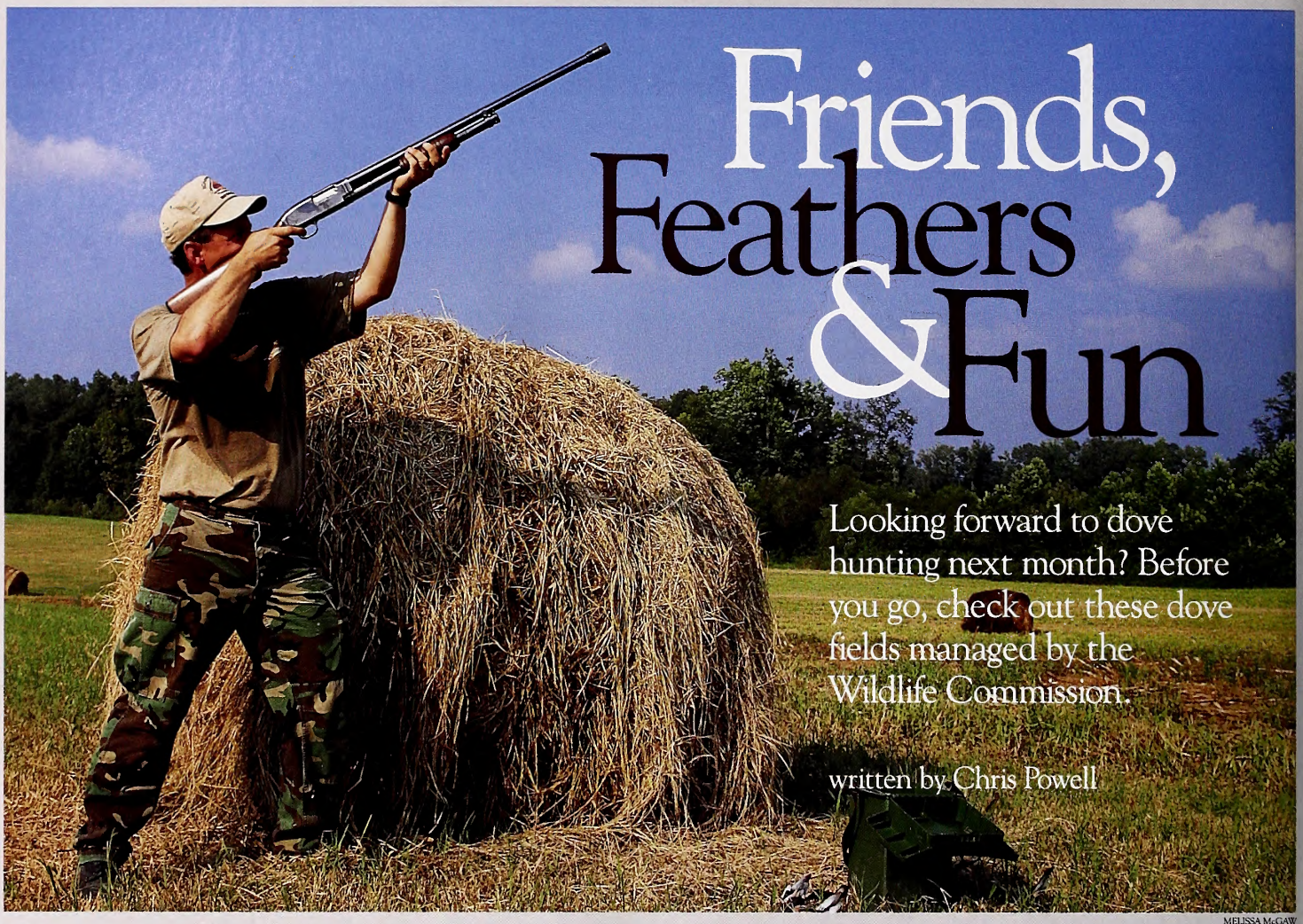
Management—North Carolina imposes a 13-inch minimum size on flounder in internal waters, with no daily creel limit, but a 15-inch minimum and an eight-fish daily limit in the ocean. These regulations reflect the fact that southern flounder, not yet under a management plan, are more of a brackish-water species than summer flounder, which prefer higher salinity and have been under a recovery plan since 1992. Management assumes that southern flounder reside inside the barrier islands, summer flounder outside, although that is not strictly the case.

Harvest pressure has increased on southern flounder, according to N.C. Division of Marine Fisheries biologist Rick Monaghan, and the state's stock is approaching maximum fishing mortality for a healthy population. Marine Fisheries classifies the fishery as one of concern and has begun to develop a management plan.

Government agencies continue trying to restore the summer flounder stock, which was overfished in the 1980s. However, after eight years under management, the species still has a fishing mortality rate that stands at nearly twice the target level. Though average size is up, the situation could get worse before it gets better, as long as spawning success continues at average or below-average levels. Environmental conditions, over which management has no control, determine spawning success.

North Carolina anglers catch a small fraction of total Atlantic recreational landings of summer flounder. The lion's share occurs from Delaware north, yet North Carolina netters report the largest commercial landings of any state. That's because of the life history of summer flounder. The Atlantic population concentrates offshore of North Carolina in winter, where it is vulnerable to trawls, yet few adult fish enter North Carolina estuaries, where many anglers have access to them.

Identification—The heart of summer flounder abundance stretches from New Jersey to the offshore waters of North Carolina. Southern flounder, which prefer less salinity in the warm months, are more likely to be found inside the barrier islands from North Carolina to Florida. Short of counting anal fin rays, lateral line scales and gill rakers, anglers can distinguish the two species by color patterns. Summer flounder usually show five ocellated, dark brown spots. Any spots on southern flounder will be less conspicuous and may not be present at all on large fish. A flounder you catch in nearly fresh water is almost certainly a southern flounder.



Friends, Feathers & Fun

Looking forward to dove hunting next month? Before you go, check out these dove fields managed by the Wildlife Commission.

written by Chris Powell

MELISSA McGAW

If you're like many North Carolina hunters, the beginning of September wouldn't be right without at least one trip to a dove field. It's a time to stow the fishing gear, dust off the shotgun and participate in a sporting occasion unique for its social atmosphere.

But not everyone lives down the road from a couple hundred acres waiting to be invaded by doves. To provide an opportunity to all hunters, the N.C. Wildlife Resources Commission spends considerable time managing numerous fields for doves throughout the state. During the spring, these fields are planted with millet, sunflowers and other plants, which are partially cut prior to Opening Day. These areas serve a dual purpose by providing places for excellent wing shooting, as well as locations for doves to feed and rest during the off days of the season.

Listed below are the locations and sizes of most of the public dove hunting fields in North Carolina. Some have directions to the fields, starting from the nearest town or major highway. Other fields are more remote, and a phone call for directions should be made to the Wildlife Commission's Division of Wildlife Management at (919) 733-7291. Also, be aware that certain game lands have specific conditions, which are listed in the *2000-01 North Carolina Inland Fishing, Hunting & Trapping Regulations Digest*.

With little effort, licensed hunters can have access to some of the state's finest bird hunting. So what's stopping you? Pick a field, grab a group of friends and become a part of one of the oldest of southern sporting traditions.

Bladen County

• **Bladen Lakes Dove Field**—This 25-acre field is located 2 miles north of the Bladen Lakes State Forest ranger station on N.C. 242. This area is open to hunting Mondays, Wednesdays and Saturdays.

• **Suggs Mill Pond**—Available by permit only, this 10-acre field is located 3.5 miles north of White Oak on Gum Springs Road. Turn left on S.R. 1327 and take the second dirt road on the right, which has a bright orange gate. To apply for the hunt, see the special hunt opportunities section of the *2000-01 Regulations Digest*.

Burke County

• **South Mountains Game Land**—This site contains multiple fields totaling about 15 acres and is near the highrise Western Youth Prison on Western Avenue (S.R. 2002) near Morganton. The fields are open to hunting six days a week.

• **Pisgah Game Land**—This 6-acre field is located in eastern Burke County in the Brown Mountain area. The field can be accessed via USFS Road 4101 and is open to hunting six days a week.

Caldwell County

• **Pisgah Game Land**—This 10-acre field can be hunted six days a week. Take S.R. 1407 to USFS Road 187 to access the field.

Craven County

• **Croatan Game Land**—This 35-acre field is available to hunt six days a week.

Davie County

• **Perkins Game Land**—Several small fields totaling 26 acres will be available to hunt Mondays, Wednesdays and Saturdays.

Durham/Chatham Counties

• **Jordan Game Land**—This game land has multiple fields, listed below, which are open to hunting six days per week.

Field off N.C. 751—From I-40, take the N.C. 751 exit. Follow 751 south approximately 7 miles. Just before Jordan Lake, there is a parking area on the right. Follow the path behind the gate to the fields, totaling about 20 acres.

Field off Big Woods Road (S.R. 1716)—From U.S. 64 at Wilsonville, take S.R. 1008 north approximately 8 miles. Take Lystra Road, which is just past the Wildlife Commission boat ramps on the left. Proceed 1 mile, then take Jack Bennett Road on the left. Proceed 2 miles and turn left onto Big Woods Road and follow for approximately 3 to 4 miles to the Wildlife Commission's public fishing access area. The fields, totaling 25 acres, are on the left.

Field off Martha's Church Road (S.R. 1752)—From U.S. 64 at Wilsonville, take S.R. 1008 north approximately 6 miles. At the lake causeway, take Martha's Church Road to the right. Proceed a quarter mile, and the 3-acre field is on the right.

Field off Sexton Road (S.R. 1748)—From U.S. 64 at Wilsonville, take S.R. 1008 south approximately 4 miles. Take Sexton Road to the left and follow to the end of the road, where there is a parking area. The 10-acre dove field is just beyond the gate, on the left.

Field off Tody Goodwin Road (S.R. 1900)—From U.S. 64 at Wilsonville, take S.R. 1008 south approximately 3 miles. Take Tody Goodwin Road to the left and follow for 3 miles. The parking area and 15-acre field are on the right.

Field off Stagecoach Road (S.R. 1107)—From I-40, take S.R. 751 south approximately 3 miles to Stagecoach Road on the right. Go a half mile and look for the first gate on the right. Go 200 yards down dirt path, and the 5-acre field is on the right.

Hyde County

• **Gull Rock Game Land**—Heading east on U.S. 264, take a right on Juniper Bay Road, which is just past Mattamuskeet High School. Then take a left on Hydeland Road. The 20-acre field is on the right and is open to hunting six days a week.

Lenoir County

• **Caswell Farm Game Land**—Owned by the N.C. Department of Agriculture, this hunting area is open Mondays, Wednesdays and Saturdays, depending on whether corn is harvested.

Martin County

• **Roanoke River Wetlands Game Land**—This hunt is available by permit only. To apply for the hunt, see the special hunt opportunities section of the *2000-01 Regulations Digest*. The 75-acre field is located on the Conoho Tract, which is off N.C. 125 between Williamston and Hamilton.

New Hanover County

• **Sutton Lake Game Land**— Open six days a week, this tract is located off U.S. 421 north of Wilmington. Three fields total 8 acres and are located along the power line right-of-way beside the entrance road to Sutton Lake.

Pender County

• **Holly Shelter Game Land**—Open Mondays, Wednesdays and Saturdays. A 6-acre field is located along Shaw Highway, just south of the Holly Shelter Equipment Depot. Another 6-acre field is located off B.J. Road in the Holly Shelter Game Land near the power line crossing.

Richmond County

• **Sandhills Game Land**—Open to hunting only the first Monday, Wednesday and Saturday of September, the J. Robert Gordon Field Trial Facility has 13 dove fields totaling 22 acres. Also, the game land contains other fields that can be hunted all dove season. The Wildlife Commission currently has 56 acres of dove fields and 132 acres of wheat fields that can be hunted. Maps to each of the fields are available at the Sandhills Wildlife Depot two weeks prior to the opening of the season. To reach the depot, take U.S. 1 south one-half mile past the Hoffman BP station. Turn right at the depot entrance, and maps will be in a folder at the gate. To reach the field trial area, turn east off U.S. 1 onto S.R. 1475 at Hoffman. Then turn right onto S.R. 1003. Go 2 miles and turn left at the field trial facility.

Wake County

• **Butner-Falls of Neuse Game Land**—This game land has multiple fields, listed below, which are open to hunting six days per week.

Field off Brickhouse Road—From I-85, take Exit 189 to Butner and follow Central Avenue 2 miles through Butner to Veazy Road on the right. At the stop sign on Old Oxford Highway (S.R. 1004), take a left and continue past the federal prison until you reach Brickhouse Road (S.R. 1630). Some of the fields are posted waterfowl impoundments. To hunt these areas, hunters must use nontoxic shot for small game.

Field off Penny Bend Road (S.R. 1004)—From Brickhouse Road, near Butner, take Old Oxford Highway west for 4 miles, after crossing Little River. The 15-acre dove field is on the left.

Field off Redmill Road (S.R. 1632)—From I-85, take the Redmill Road exit north for approximately 1 mile, just before Ellerbe Creek. The parking area is on the left. Five acres are planted for dove. A mile and a half down Redmill Road, another 3-acre field is located just before the Eno River, on the right.

Field off Hamlin Road (S.R. 1634)—From I-85, take the Redmill Road exit north for 1.5 miles. At Chewning School, take a left on Hamlin Road. Follow it for 3 miles until you reach a narrow farm path, which will lead to the parking area. The 2-acre field is beyond the gate.

Field off Hertford Road (S.R. 1800)—From I-85, take Redwood Road south and proceed for approximately 2 miles across Falls Lake. Then take the next road to the left, which is Hertford Road. Just across the causeway is a gated path on the left, leading to the 6-acre dove field.

Field near Gene's Body Shop (S.R. 1903)—From I-85, take Exit 186 to N.C. 15 going east toward Creedmoor. Proceed one-quarter mile and take Will Suit Road to the right just past Lyon's gas station. Follow it to the intersection of Old Weaver Trail and Boyce Road. At the stop sign, continue straight across. Proceed 2 miles, then take a right at the stop sign at Olive Grove Church Road and follow it to the end. The fields, totaling 35 acres, are just beyond the gate. (This road is usually open for hunter parking on the first day of the season.)

MELISSA McGAW

Field near Beaverdam and Old Weaver Trail (S.R. 1906, 1901)—From Creedmoor, take N.C. 50 south toward Raleigh. After 5 miles, take Old Weaver Trail to the left and cross the lake. Take the first road on the left, which is Beaverdam Road. The parking area and 10-acre dove field are 200 yards on the left.

Yadkin County

• **Huntsville Community Farms Game Land**—This 6-acre field is open to hunting Mondays, Wednesdays and Saturdays. ⊠

Nantahala National Forest

Touring the Cherohala Skyway

Remote southwestern North Carolina arguably contains the state's most spectacular mountain vistas, and some of its most hallowed natural heritage sites.

written by J. Dan Pittillo ©2000

Let's admit at the outset that sampling the natural wonders of North Carolina can be—and hopefully is—a lifelong endeavor. From the coastal salt marshes to the fog-haunted mountain peaks, the state offers a tempting smorgasbord of topography and natural communities to choose from.

Having said that, there are few regions as spectacular as the extreme southwest corner of the state. One of the best ways to taste the wonders of this region is by traveling the Cherohala Skyway from the Tennessee line to Big Santeetlah Gap. The Cherohala Skyway tour is only 18 miles long, but it gives you some of the best views of the Southern Appalachians across the Unicoi Mountains just south of the Great Smoky Mountains. Included in the tour is the wide expanse of Joyce Kilmer Memorial Forest, with its storied stand of ancient trees, and the breathtaking views from the high ramparts of Hooper's Bald.

In many respects this tour matches the stunning views characteristic of the Blue Ridge Parkway as it crosses the Balsam Mountains between Asheville and Cherokee. "Mountains piled upon mountains" was how explorer William Bartram described the views in this area in the 18th century. The lowest valleys visible occur at around 1,900 feet and the highest peak in the Smokies rises over 6,600 feet. The forests here range from cove hardwood and hemlock forests on the valley floors to mixed oak and pine forest on the lower slopes and weather-pruned northern hardwoods at the higher elevations, mainly above 4,500 feet. One may encounter animals—bear, deer, raccoons, foxes, turkeys, grouse—or perhaps brilliant fall leaf colors or pastel spring accents on the surrounding ridges.

This tour allows you to look backward at the mountains' glacial past: as you cross some of the most elevated landscapes of North Carolina, you will see plants adapted to the cooler climates that existed throughout the South 18,000 years ago. Most of the region was covered in primeval forests until the turn of the 20th century. Babcock Lumber Company logged the area to the north between 1915 and 1922, when it was forced to cease operations because Calderwood Reservoir was built along the railroad route. This area is also the site of introduction of the notorious wild boar. Five species of big game animals were initially introduced into the Hooper Bald game preserve in 1912. Only the boar remains.

The Cherohala Skyway has mile markers along the route. The mileages are listed throughout the text for each location, with the reverse mileages given in parentheses. Allow about two or three hours to visit Joyce Kilmer Memorial Forest and another couple of hours to drive the Cherohala Skyway. The driving distance is a little less than 40 miles round-trip, but the elevation gain from the base of Joyce Kilmer to the top of Hooper Bald is 5,429 feet.

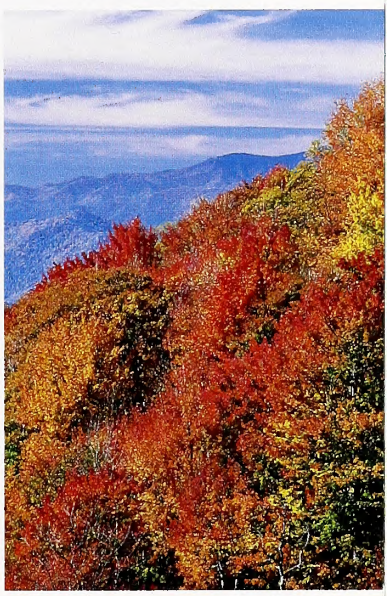
Big Santeetlah Gap

Pull off at the overlook and information station at Big Santeetlah Gap, mile 17.8 (0) of the Cherohala Skyway. View to the north the valley of Joyce Kilmer Memorial Forest. In the foreground is Horse Cove Ridge. Strawberry Knob lies to the far left (west), and Stratton Bald, at 5,341 feet, is on the horizon to the north, with Haoe Bald (5,249 feet) and Haoe Lead forming the margin of the basin. At this gap you are at 2,680 feet elevation. Consider turning back and driving down to the left (north), following signs 2.3 miles to the Joyce Kilmer picnic area, and hiking up to Poplar Cove.

Joyce Kilmer Memorial Forest

The Joyce Kilmer Memorial Forest was established in 1936 as a 3,800-acre primeval forest, from which timber has never been removed. The forest is a part of the Joyce Kilmer-Slickrock and Citico Wilderness. Take a short hike through the grove of big trees at Poplar

Fall Colors



WILLIAM S. LEA

"One may encounter animals—bear, deer, raccoons, foxes, turkeys, grouse—or perhaps brilliant fall leaf colors. . . on the surrounding ridges."

WILLIAM S. LEA

OLD-GROWTH YELLOW POPLAR / JOYCE KILMER MEMORIAL FOREST

J. DAN PITTILLO

FIRE PINK

BRITISH SOLDIER LICHEN & MOSS

WILLIAM S. LEA

Cove. Two loop trails begin at the parking area and offer views of the lush, mature cove forest. It will take about one or two hours to hike this easy-to-moderate loop trail and enjoy the scenery. The elevation is 2,200 feet at the entrance and 2,600 at the top of the loop.

The Poplar Cove contains some of the largest yellow poplars (also called tulip trees or tulip poplars) in the forest. Some trees have trunks more than 6 feet in diameter and are well over 100 feet tall. At the juncture of the figure-eight loop is a Canadian hemlock that is approximately 4 feet in diameter. It stands tall above a bronze plaque commemorating the poet Joyce Kilmer, who was killed during World War I. There are large American beeches, magnolias, sugar maples, mountain silverbells, basswoods, oaks and hickories that add to one of the greatest plant diversities of any deciduous forest in the world. The forest floor is carpeted early in spring with many flowers—spring beauty, trout lily, trilliums, violets, blue cohosh, hepatica, windflower, dwarf ginseng, buttercups—and later with overtopping summer herbs—ferns, sedges, cohosh and little dolls eyes.

You are likely to encounter birds here, especially in late spring when the neotropical migrants return and begin to nest. You may hear the melodious gurgling of winter wrens in the rhododendron thickets, repetitive melodies of the vireos in the trees, and the many kinds of twittering that signal the presence of the warblers that inhabit these old-growth forests. The presence of neotropical bird migrants is one of the important features of Joyce Kilmer Forest. Warblers—including black-and-white, black-throated blue, chestnut-sided, hooded and Canada—are especially notable here beginning in April as they return from the tropics and begin to nest. One of my favorite songs is uttered by the wood thrush, which is sometimes called the nightingale because it occasionally bursts into song late at night.

Evidence of black bears, bobcats, mink, raccoons and gray squirrels has been observed in the forest here. You might see tracks of any of these in the mud along the trails. Black bears sometimes forage in the area, though you are more likely to see clawed-up logs or yellow jacket nests where they enjoyed a feast of young grubs. (If you do come upon a nest of yellow jackets, try to avoid it; they are the cause of the greatest number of injuries sustained in the forests of the region.) Wild boars are plentiful here because this is where boars trapped in the Great Smoky Mountains National Park, just to the north, are released. Bobcats, skunks and deer are also rather common in the area but are not usually seen during daylight hours.

If you drive to mile 15.8 (2.0), you will come to a picnic area high on the ridge overlooking the region.

Camera Photo Point

After a hike and a picnic, you can return to the Cherohala Skyway, but for less than a mile. Stop at the overlook at mile 14.7 (3.2). Starting from the left (west) you see Stratton Bald, with Haoe Bald and Haoe Lead making up the middle ridges. Down in the foreground is Horse Cove Ridge, where even-age timber management is being carried out. The U.S. Forest Service manages the forest here by several methods, but in the newest one they have cut small blocks (1 to 3 acres), leaving the larger trees between to be cut at a later date. In these cleared blocks, most trees (oaks, for instance) resprout and regrow in about 80 years. Other trees, such as tulip poplar (notice there is more of this species in these cleared forests than in uncut ones), grow from seeds. At higher elevations black cherry is one of the most valuable timber species. Farther back on the horizon you can see the Great Smoky Mountains, beginning with Gregory Bald at 13 miles and, on the clearest days, Mount LeConte in Tennessee, 35 miles distant at the far right.

Wright Creek Old-Growth Hemlock and Hooper Bald Overlook

Stop at mile 12.3 (5.5) for a fine view of old trees. Grand old-growth Canadian hemlock forest occupies the valley along Wright Creek below to the right. Canadian hemlocks, the eastern counterpart of the better-known western hemlocks, live to be nearly 1,000 years old (the record is 988 years, and 600 years is often attained). They often exceed 150 feet in height and 6 feet in trunk diameter in this region. Here, in the less protected higher elevations, these trees probably are closer to 100 feet tall and perhaps 200 to 300 years old. Nonetheless, their festoons of old-man's beard lichens (*Usnea spp.*) give them an ancient appearance among the younger beeches, birches and other deciduous trees. There is some concern that these metaphors of the ancient Appalachians may be in jeopardy, just as our Fraser fir forests have been during the past couple of decades. The hemlock woolly adelgid, an insect pest introduced from Asia in the 1920s, weakens and destroys hemlocks. Though scientists have been searching for years for a way to stop the menace, the adelgid is progressing down the Appalachian chain and now has reached North Carolina. This may be a scene that you wish to photograph for posterity.

The Cherohala Skyway continues its ascent another 1,200 feet to mile-high Hooper Bald. This is one of the most scenic sections of the tour. Much of the roadway through this region cuts through a highly acidic sulfurous rock known as Anakeesta schist. Excavations through this formation and exposure of the rock allows release of significant amounts of acidic water into the streams. This was discovered when a section of U.S. 441 was constructed through the Great Smoky Mountains National Park in the 1960s. To correct for this, the rock must be carefully covered with soil. The rapid release of acids

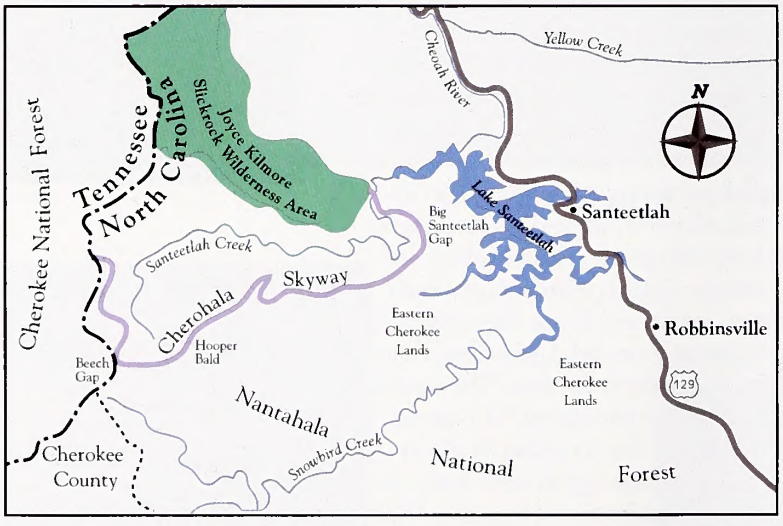
Bobcat

WILLIAM S. LEA

"It is not uncommon to see a combined trail of grouse followed by a fox or bobcat."

J. DAN PITTILLO

PHLOX / BOB BALD



The best way to reach this region is to follow Interstate 40 west of Asheville to the Waynesville and Sylva exit (Exit 27). Then follow four-laned U.S. 74 west to Alarka, where it meets N.C. 28. From there follow two-laned N.C. 28 to N.C. 143, and follow the signs north via Robbinsville to Santeetlah Gap, where the Cherohala Skyway begins. If you are driving from Murphy, follow U.S. 19 to Topton and continue to Robbinsville on U.S. 129. In Robbinsville, intercept N.C. 143 and continue as above. This road (N.C. 143) connects with the Tellico Plains Road (Tenn. 165) into Tennessee at Beech Gap on the Tennessee border.

HEMLOCK / WRIGHT CREEK

J. DAN PITTILLO

into the stream causes a lot of fish and other aquatic life forms to perish.

As you follow the ascending highway, you will swing around the headwaters of Wright Creek and enter briefly into the headwaters of Big Santeetlah Creek before continuing across the crest to Hooper Bald. You will be able to look back at the skyway as you progress up a major switchback.

Botanists usually call the forests at this elevation (about 5,200 feet) "northern hardwoods" because they have many of the same species that are found in forests in the northern states and southern Canada. The dominant species here are northern red oak, yellow birch and American beech. There are also red maple and serviceberry, along with heath bushes in the understory consisting primarily of blueberries, mountain laurel and rhododendron.

Our southern highlands, however, contain many species that have become locally adapted, and so we call them "endemics." The plant composition here differs from that of true northern hardwood forests. At the latitude and elevation of this tour, the vegetation does not include the more northern spruce-fir forest. However, paleoecologists have found evidence that during full glacial times both spruce and jack pine did extend to this location, and even a little farther south into northern Georgia.

The earliest tree to bloom here is serviceberry, or "sarvis," opening in March at the lower elevations but as late as May in the upper elevations. The rhododendrons occur in the deciduous forms, mainly flame azalea, as well as the evergreen purple rhododendron and rosebay. In June the flame azaleas are still blooming as purple rhododendrons begin their show. Mountain laurel, or calico bush as it is sometimes called, blooms just before the flame azaleas begin and continues into June and early July as well. July is a month for meadow flowers at these higher elevations. The pink phlox, for which the Pink Beds in Transylvania County were named, will be increasing during the next couple of decades as the disturbed roadside vegetation undergoes the process of succession. You may spot fire pink (called a "pink" because of the notches cut in the petal tips, not because of its color)—a five-petaled crimson spring flower that lasts until July at these elevations. There are Turk's-cap lilies bordering the woods, and various mints, especially bee balm, bergamot and lemon mint, grow in patches along the borders of the highway. In the fall, the reds of the red maples and northern red oaks are framed by the yellows of the birches and by rusty brown beeches.

In April and again in September the Hooper Bald area is a good vantage point from which to observe the spring and fall migrations of birds and butterflies. Spring migrations often are more colorful, as the birds flying north are in their spring breeding plumage. One of the most colorful is the goldfinch, the male decked out in brilliant yellow with black wings, or the scarlet tanager in equally brilliant scarlet plumage with black wings. Hawks, especially broadwing hawks, are particularly graceful and abundant as they fly north in the spring and south in the fall.

Winter at the high elevations can deal out some surprises. Supercooled clouds often pass over the crests of mountains and the droplets freeze to the vegetation in a form called rime ice. The rime builds up in the direction of oncoming clouds, and sometimes rime coats two sides of a twig, indicating that there has been a shift in the cloud movements during the past several hours. This rime ice may build up to several inches thick and may create hazardous conditions on the roadway. But the rime-encrusted trees, often bending with their load, create some beautiful scenery. At these higher elevations, the trees become deformed into krummholz—flat-shaped, stunted forms—often indicating the direction of the prevailing winds.

Though the bird diversity is lower in winter at these high elevations, there are nonetheless several species present. Ruffed grouse are often seen or heard, especially the low drumming sounds of the male as he beats his wings against his puffed-up breast to signal his territory. They can be seen easily in snow, and their tracks are often evident. It is not uncommon to see a combined trail of grouse followed by a fox or bobcat. Thus, it will be instructive if you can find a calm, sunny day after a snowfall to explore the area around Hooper Bald.

Beech Gap

Stop at the overlook at Beech Gap, mile 0 (17.8): you are on the North Carolina-Tennessee line. To the west are the drier forested hills and mountains of the Cherokee National Forest of eastern Tennessee. To the east is Big Santeetlah Creek valley. The Cherohala Skyway continues down to Tellico Plains in Tennessee. If you look around at the beech trees here, you will note that many mosses and lichens inhabit their trunks and branches—an indication of the frequent rains and clouds that shroud this region. Though you could not call this a true cloud forest, this feature gives you an idea of what a cloud forest is like. From this vantage point you can also look into Tennessee and its portion of the Great Smoky Mountains National Park, where further examples of high-elevation Southern Appalachian mountain forests can be seen. ⊠

J. Dan Pittillo is a professor of botany at Western Carolina University.

"Touring the Cherohala Skyway" is adapted from Exploring North Carolina's Natural Areas, Parks, Nature Preserves, and Hiking Trails, *edited by Dirk Frankenberg. Copyright* ©2000 *by the University of North Carolina Press. The book is a collection of 38 ecotours of "the best preserved, publicly accessible examples of North Carolina's natural landscape." Used with permission of the publisher.*

Wood Thrush

MASLOWSKI WILDLIFE PRODUCTIONS

"One of my favorite songs is uttered by the wood thrush, which is sometimes called the nightingale because it occasionally bursts into song late at night."

Little Alligator Summers

Day after bright day, it was the same. Breezes through the screens, the slap of water under the cabin floor, the hot buzz of insects in the marsh and bayberries, corks dancing on dark water, suppers in the cook shack and long sunsets until bedtime.

written by Jim Dean ©2000

illustrated by Chris Armstrong ©2000

The blackwater run of the Little Alligator River isn't very wide where it passes under U.S. 64 east of Columbia in Tyrrell County, but its cypress-rimmed shorelines spread rapidly as you head downstream into a huge bay that joins the even larger mouth of the Big Alligator River. This is big water, almost invariably choppy, the color of steel, streaked with wind. On a clear day, you can look east across the Big Alligator and see the hazy, distant shores of Durant Island and Dare County. To the northeast, only sky and water meet on the near-invisible horizon of Albemarle Sound.

It was here, in the early 1930s, that my grandfather W.S. Dean and some of his friends took a long-term lease on an old cabin that stood on pilings just inside the hook of a marshy island on the north side of the mouth of the Little Alligator. They fixed it up, repaired the boathouse, added more boardwalks and installed a Delco generator for electricity. Except for rainwater that collected in a wooden gutter and ran into a large barrel, all supplies—ice, food, bedding, gear—had to be brought out by boat each trip. For years, until they began to get too old, my grandfather and his friends gathered here to fish in the summer and hunt waterfowl and deer in the fall and winter. My family often made the trip in the summer.

The cabin itself included a central room heated by a potbellied

stove and flanked by four small bedrooms. There were a separate cook shack, dining room, woodshed and outhouse, all raised a foot above the dark waters on pilings and connected by boardwalks. The place was livable enough that Geneva and Graham, my mother and father, spent part of their honeymoon there in 1939. I once did the math to see if that explained my existence. It didn't compute, but it would have explained a lot.

My memories of this place begin a year or two after Dad returned from Germany in 1945. We would leave Halifax County hauling a dangerously overloaded trailer, cross the Cashie River at Windsor and strike Route 64 near Plymouth. We'd then head east across the Scuppernong River at Columbia and on to Fort Landing through seemingly endless swamp forests on a narrow road flanked by deep canals, where it was not uncommon to see a bear. Even at age 7 or 8—maybe especially at that age—I felt that we were leaving the known boundaries of civilization for a place mysterious beyond knowing.

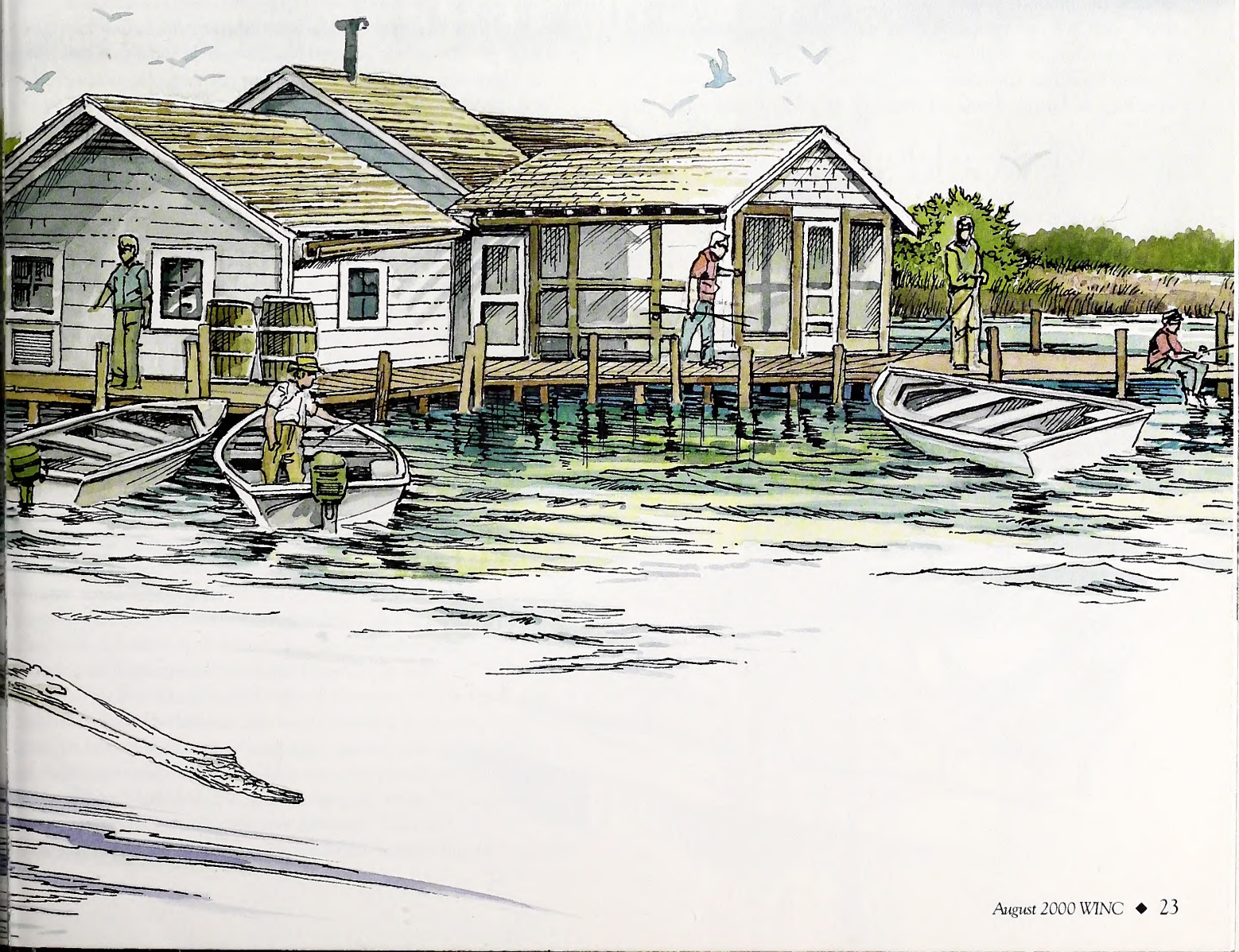
It was an adventure filled with delicious possibilities. Maybe, I half hoped, a bear would charge. Or the trailer would catch fire—again. I had often heard the story about the time when Granddad and his friends were on the last leg of the trip and noted with appreciation how friendly on-coming drivers seemed to be. They all waved and continued waving. Granddad waved back. Finally, someone noticed that the tarp over the trailer was on fire. Granddad quickly pulled over, but the flames rushed forward, threatening to engulf the trailer, which held not only all the tackle but also gasoline cans and shotgun shells. Bait buckets that might have been used to get water from the ditch were all under the burning tarp.

"Everybody out," Granddad ordered. "I'll drive fast enough to put it out."

Back on the road, he gunned his old Buick faster and faster past waving motorists, but every time he slowed down to check the status of the fire, it blazed higher, and closer. Finally, it reached the gas cans and shells with spectacular results.

In desperation, Granddad backed the trailer into the flooded ditch. That saved the outboard motor and most of the tackle, but the blue paint on the trunk carried the speckled reminder of that event for as long as he owned the car, and I still have my father's old South Bend casting reel with its melted knobs.

Alas, the family trips I recall were made without such invigorating incidents. Our guide—Bradford or, occasionally, Bill— would meet us at the small store at Fort Landing and help us load the big juniper skiffs for the 3-mile ride from the abandoned ferry slip out past Eagle Island



to the low marsh island and the cabin. Granddad's 4.5-horsepower Martin would barely move one of those heavily laden boats. It seemed to take forever, and sometimes we had to make several trips.

We shot our way in. With the skiffs cruising slowly past the cabin like ships of the line, Dad and Granddad would sit in the bows with .22 rifles and fire broadsides at sunning moccasins until the boardwalks were cleared for landing. Then we would unload supplies, clean the rat droppings off every flat surface and settle in for two or three weeks.

All those days are blended now so that many distinct memories are lost, but my mornings were always the same. At first daylight, I would awake to the distant drone of an outboard headed somewhere very slowly. The sound entered consciousness so easily that you were not aware of it until it was annoying, and you knew it would take at least that much longer for it to pass and entirely fade away. I would slip out the screen door and explore the wet boardwalks barefooted, shivering a little until the sun began to burn off the haze. I carried a cane pole to fish around the remnants of the boathouse, or along the narrow boardwalk that ran to the outhouse. Periodically, the Delco would come on with a steady thump that recharged the batteries, but mostly I would have only mosquitoes and bullfrogs for company.

At sunup, while our guide was cooking a massive breakfast on a stove fueled by bottled gas, we would brush our teeth and wash up with lye soap in the cold water from the rain barrel. Even so, by the end of the first week we would have established a more or less permanent patina of 6-12 insect repellent, suntan lotion, fish slime, dried sweat and other varieties of exotic grime that no mosquito could penetrate, or would want to.

After breakfast, the boats would be loaded for the day's trip. They were kept tied up alongside the dock, 17- to 19-foot skiffs solidly built of juniper with foredecks and wide cowlings along gunwales that were stable enough to stand on. The skiffs were invariably painted gray, and no better or more seaworthy boat has ever been made for these waters. We didn't have electric motors then, but the boats handled so well that a man with a long pushpole could have walked one of them up the Amazon into the teeth of a cyclone. Though we fished in them somewhere almost every day, there was plenty of time to hang around the cabin shooting floating targets with a BB gun, playing Chinese checkers, or sitting back and exploring the huge expanse of sky and water. Day after bright day, it was the same. Breezes through the screens, the slap of water under the cabin floor, the hot buzz of insects in the marsh and bayberries, corks dancing on dark water, suppers in the cook shack with lamp-thrown shadows of ourselves on the rough, unpainted walls and long sunsets until bedtime.

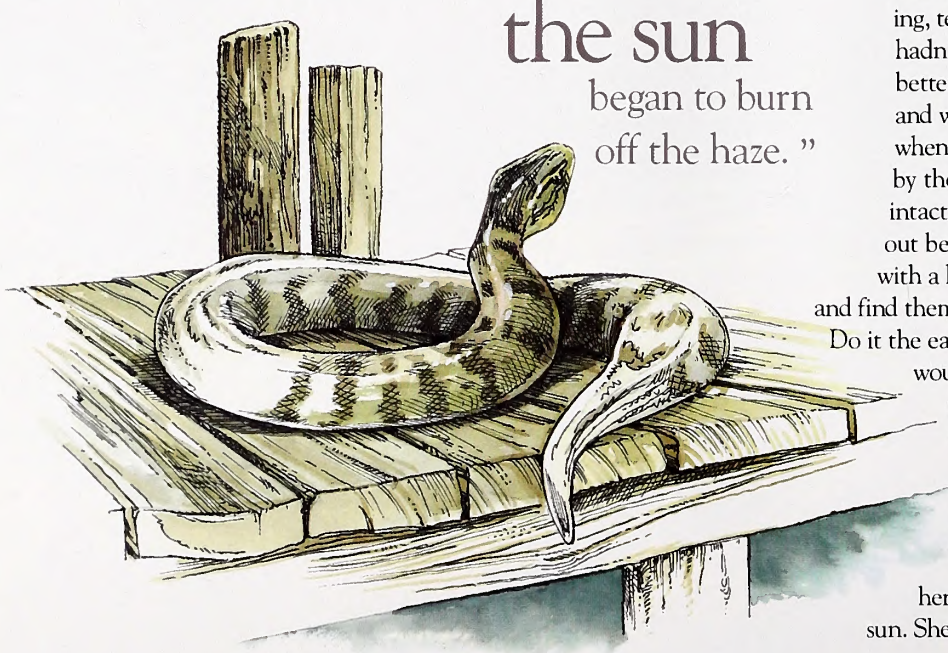
Sometimes, I would simply lie on the dock and look into the brackish water, watching juvenile gar hunt small minnows among the pilings. But I tended to avoid the dark, back corner of the cabin where it nestled against the marsh after I ventured there one morning and found a huge snake with a body as big around as my thigh, its white belly bloating in the sun, still showing the water-bleached creases where a .22 hollowpoint had plowed through its coils. Where, I wondered, were the cottonmouths we had missed?

I didn't catch many fish, surely none of any size, around the cabin. The real fishing took place in the skiffs. We would usually fish all day, carrying lunches and Granddad's old, round metal cooler full of water, water that always had a peculiarly refreshing metallic taste when you poured it into the aluminum cap that also served as a cup. Often, we would drift down the open mouth of the river for white perch, cane poles fanned out over the stern and baited with shrimp. Or we would anchor in the gut to the goose pond and fish for sunfish. The sunfish were mostly hand-sized redbreast sunfish—we called them robin—and pumpkinseeds, but I don't recall that we ever caught bluegills.

Bradford was the guide who accompanied us most often. He was a big, jovial man—rough and friendly—and he and Granddad often laughed at things that I'm pretty sure my brothers Graham and John and I weren't expected to understand. He would brag about our success fishing, telling everyone that we had caught them all—we hadn't—and that no one he'd ever fished with was any better at it. He also showed us how to clean the sunfish and white perch, leaving the fins and tails on so that when they were fried, all you had to do was hold the fish by the tail and peel out the dorsal and anal fin bones intact. He teased Dad for stubbornly trying to cut them out before the fish was cooked. "Can't get them bones with a knife, Mr. Dean," he said. "Always cut some off and find them in your mouth. Too late, then, have to eat 'em. Do it the easy way." Dad, who never believed in the easy way, would keep sawing away until he delivered a pile of fish that looked like little otter-gnawed fishcakes, which everyone else left on the platter.

It was Bradford who cooked and guided for Mom and Dad on their honeymoon, and he was so taken by my mother's dark eyes and slender figure that he went out one morning before daylight and brought her water lilies that were just opening in the morning sun. She never forgot that nor, probably, did Bradford.

"I would slip out the screen door and explore the wet boardwalks barefooted, shivering a little until the sun began to burn off the haze."



Unlike Bradford, our sometime guide Bill was a small, red-faced man of vast understatement. "A drinking man," I once heard Granddad surmise when he thought I wasn't listening. But Bill left his addictions, if any, at the dock, and he faithfully tended the boat and helped us keep our poles baited for white perch that ran up to 2 pounds. Every 10 minutes or so, he would reach over the side of the skiff and scoop up water with both hands to smooth back his long gray hair—we never knew if that was vanity or therapy. But one day, during which he had characteristically said absolutely nothing, he made what was for him a significant speech. As we drifted, watching our lines, the cork on his pole plunged so quickly it shot a spurt of water a foot into the air. Instantly, the pole bent sharply until the tip was in the water, levering Bill off the seat. We thought he was going overboard until the pole snapped in two places. Bill held the butt momentarily until the line parted with a loud twang, catapulting him backward into the bottom of the boat like a sack of feed.

We watched in amazement as he regained his seat with great dignity. Methodically, he wet his hair and sat for a long moment looking off nowhere in particular.

"Rockfish," he said finally.

My grandfather's tackle consisted of a split cane Heddon casting rod and a Pflueger Supreme bait-casting reel with black linen line and a short length of gut leader. His favorite lures were old wooden plugs, some with glass eyes, all scarred from use—a frog-colored Jitterbug, a Lucky 13, several Creek Chub crippled minnows, as well as a few Johnson silver minnows, Al Foss Shimmy wigglers and Oriental wigglers that were rigged with pork rind trailers. He especially liked to use a Hawaiian Wiggler and pork rind worked along the surface over the weeds in the goose pond. I don't recall that we caught many big bass —a 2-pounder was cause for celebration, although I recall that he once caught two rockfish—but perhaps it was because we were almost always vacationing in the hot summer months, when fishing for bass and stripers was generally poorer.

Some years earlier, Granddad had caught a 9-pound bass, but when he returned with it that evening, his cronies convinced him that he ought to put it in a wire fish cage that was kept in the water next to the cook shack.

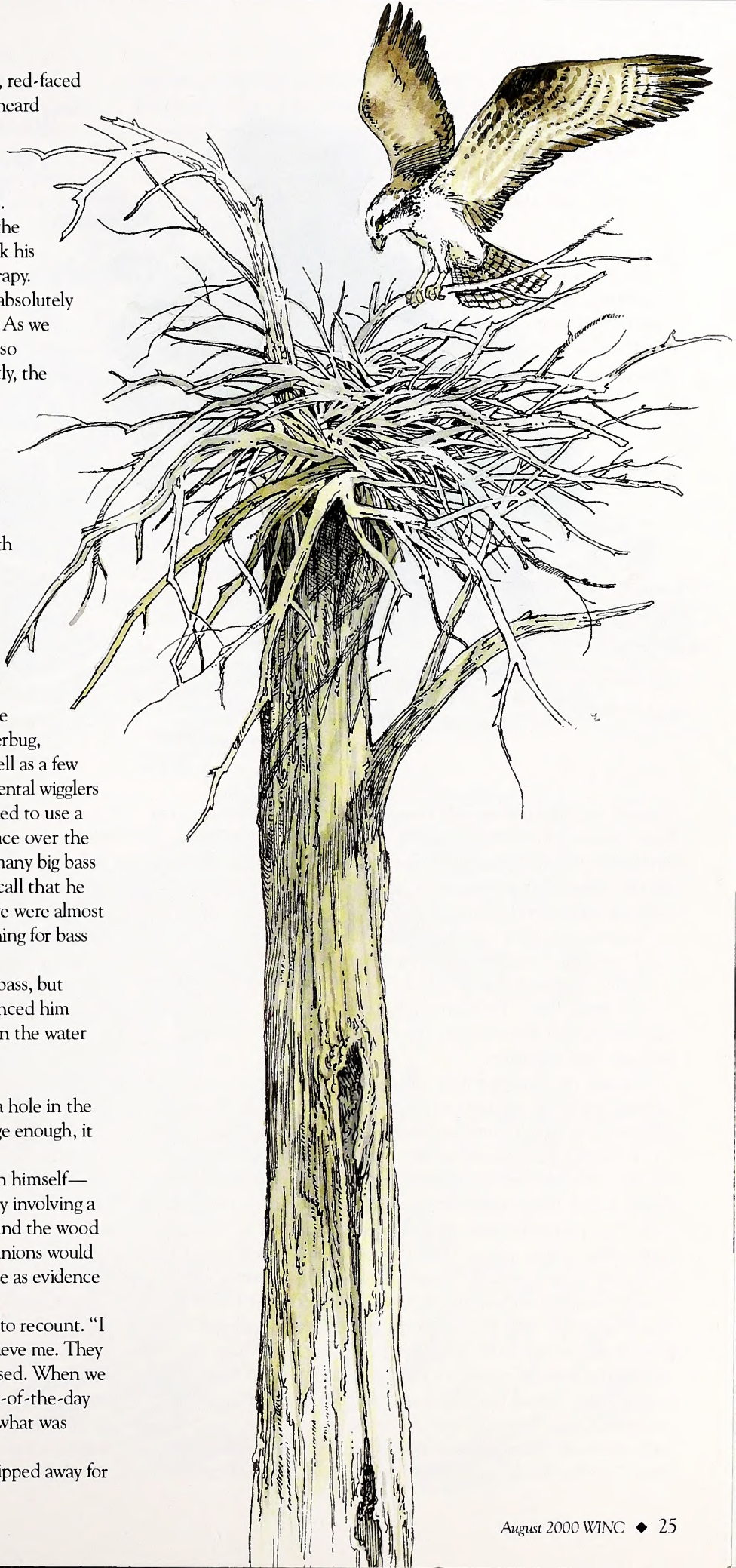
"It'll keep him alive and fresh," they told him.

What they neglected to mention was that there was a hole in the wire that covered the lower end of the cage—a hole large enough, it turned out, for Granddad's trophy to escape.

Granddad often told that story—he enjoyed a joke on himself—but he had an even greater appreciation for another story involving a shirttail. There were lots of these tacked to the wall behind the wood stove. If you missed a shot at a deer, your hunting companions would cheerfully cut off the tail of your shirt and mount it there as evidence of your poor marksmanship. But this one was special.

"They claimed I had missed a deer," Granddad liked to recount. "I explained that I had shot at a goose, but they didn't believe me. They heard the shot. I didn't have a deer or a goose. Case closed. When we got back to the cabin that evening, they fixed their end-of-the-day drinks as usual and kidded me all through supper about what was going to happen to my shirt."

While they were finishing up the dishes, Granddad slipped away for



"We fished the little cove around the cabin, the goose pond...anywhere **largemouth bass** were likely to be caught."

Cafe itself would be only a memory. In the early 1950s, I vaguely remember hearing talk that the cabin was settling and would need expensive repair—the boathouse, long unused, had already collapsed— but when you are young and your family is healthy and together, there is little sense that anything will ever change, especially things so dear and seemingly permanent.

During those last years, high tides more frequently flooded the floors of the cabin, so that the decoys would float out of their piles in the corners, and we sometimes had to wear boots to get around. But occasional high water had always been one of the more charming inconveniences. One night years earlier when water had flooded the cabin, my grandfather awoke with what he called "an inclination." He was fumbling around in the dark looking for his boots and making enough noise to wake John Edwards.

"What are you doing, Bullet?" Edwards asked, using the nickname my grandfather had long held because his head was as bereft of hair as, well, a bullet.

"I've got to go out a minute," grandfather explained modestly.

"You're going to wade out there in the dark across a flooded narrow boardwalk all the way to the outhouse just to take a leak?" howled Edwards. "For God's sake, why in hell don't you just roll over and let her rip. With this tide, it'll probably beat you back in here anyway."

As my obsession with fishing grew, I came to believe what all fishermen believe—that you can stockpile luck. The theory is that the longer you go without catching a fish, the bigger that fish will be. On one of our later family trips—quite possibly the last, in 1955 or 1956—I determined that my time had come to catch a big bass. Granddad's 9-pounder was still out there for all I knew, and I was certainly due. That summer, I still got up before dawn to fish the boardwalks, and I still fished for white perch and sunfish when that was the only option offered, but I had largely retired my first piece of fishing tackle, a paint-cracked green and white cork. I now had a new Shakespeare spinning rod and reel and several lures.

Whenever I could persuade Granddad or the guide, we fished solely for bass. We fished the little cove around the cabin, the goose pond, the shores and upper reaches of the Little Alligator, the shoals

a few minutes and put on Ted Deloach's shirt—he was the one most bent on seeing this tradition upheld. After supper, Ted made a short, largely insulting speech, wheeled my grandfather around and cut off the tail of that shirt all the way to the collar. Then, he tacked it on the wall and stepped back to admire it.

"How do you think it looks up there?" Ted asked my grandfather.

"Looks fine, Ted, especially since it's not my shirt," Granddad said.

"Well, whose is it then?" Ted asked.

"It's yours, Ted." The shirttail stayed on the wall, and no one loved to tell about it more than Ted Deloach did. Except, of course, my grandfather.

Through the years, the little town of Columbia was an anticipated waystop, a place to stretch our legs for the final assault. We would stop at the service station just beyond the single-lane bridge (now gone). Sucking on sodas, we would venture through the village past the old Columbia Hotel (rooms went for $2-$4) and down dirt side streets. Or we would walk over to the catfish factory on the banks of the Scuppernong. I swore that one day, if I couldn't live in a cabin built a foot over the water 3 miles beyond Fort Landing, I would live in Columbia, or in Tyrrell County's second-largest metropolis of Gum Neck, near the Frying Pan. Or I'd live in the big house (also long gone) across from the small store at Fort Landing, where I would prosper on Zero candy bars and TruAde. I didn't realize that my summers in this vast and wondrous place were soon to end. Nor did it seem possible that all those wrecked cars crudely painted with "Eat at Carley's" advertisements that sat seemingly every few hundred yards on the shoulders of Route 64 for 20 miles in either direction from Columbia would someday be hauled away—or that Carley's

in the mouth of the Big Alligator, the Frying Pan, anywhere large-mouth bass were likely to be caught. But, of course, it was dead-hot July or August as usual, and the fishing was poor along the shallow shorelines where I was certain bass lurked along grassy edges and among the flooded cypress. Day after day, I cast while others soaked bait. I caught only one bass, which my Nip-I-Diddee must have snagged in mid-yawn. It was small—maybe 10 inches—but I was certain that it was a sign of what was to come.

On the last day, I fished all morning while the dishes were washed and gear was packed and loaded. When it was finally time to leave, I was still walking the boardwalks, casting furiously, retrieving the Nip-I-Diddee so rapidly that it left a wake like a small motorboat. I was certain that my trophy would catch up with it any moment.

They were calling. One more cast, I said. One more, one more. They were all in the boats. The outboards were running. Finally, Dad came and gently led me to the boat. It would be another decade before I returned to the Little Alligator.

On a late fall day in 1968, eight months after the death of my grandfather, I helped my old high school friend Charlie Ogletree load his boat near the 64 bridge. We ran down the Little Alligator and steered a course across its broad mouth until I began to pick out landmarks that were familiar to me. There was Eagle Island—we always passed it when we came out here, and it had a massive nest in a tall, dead tree on the east end. It was probably an osprey nest, however, not an eagle's.

I showed him the entrance to the gut that led to the goose pond. And just around the grassy point we entered a small, sheltered cove, where two of the cabins that I remembered were still standing against the right-hand shore, weathered sentinels crouched low on pilings over the dark water. They were little changed and were apparently being cared for and used by someone. We idled slowly until we came abreast of another cabin on the left, the one I had come to see. Charlie killed the motor and we drifted.

"That's it, isn't it?" he said.

I nodded. The main building was window-deep in the water, and most of the deck and boardwalks that had once spread out around it like the white of a fried egg were long gone. The separate cook shack, dining room and woodshed had a crazy tilt, half submerged, but the outhouse still stood like some ancient blue heron, looking as solid and ready for company as ever. We said nothing for a while.

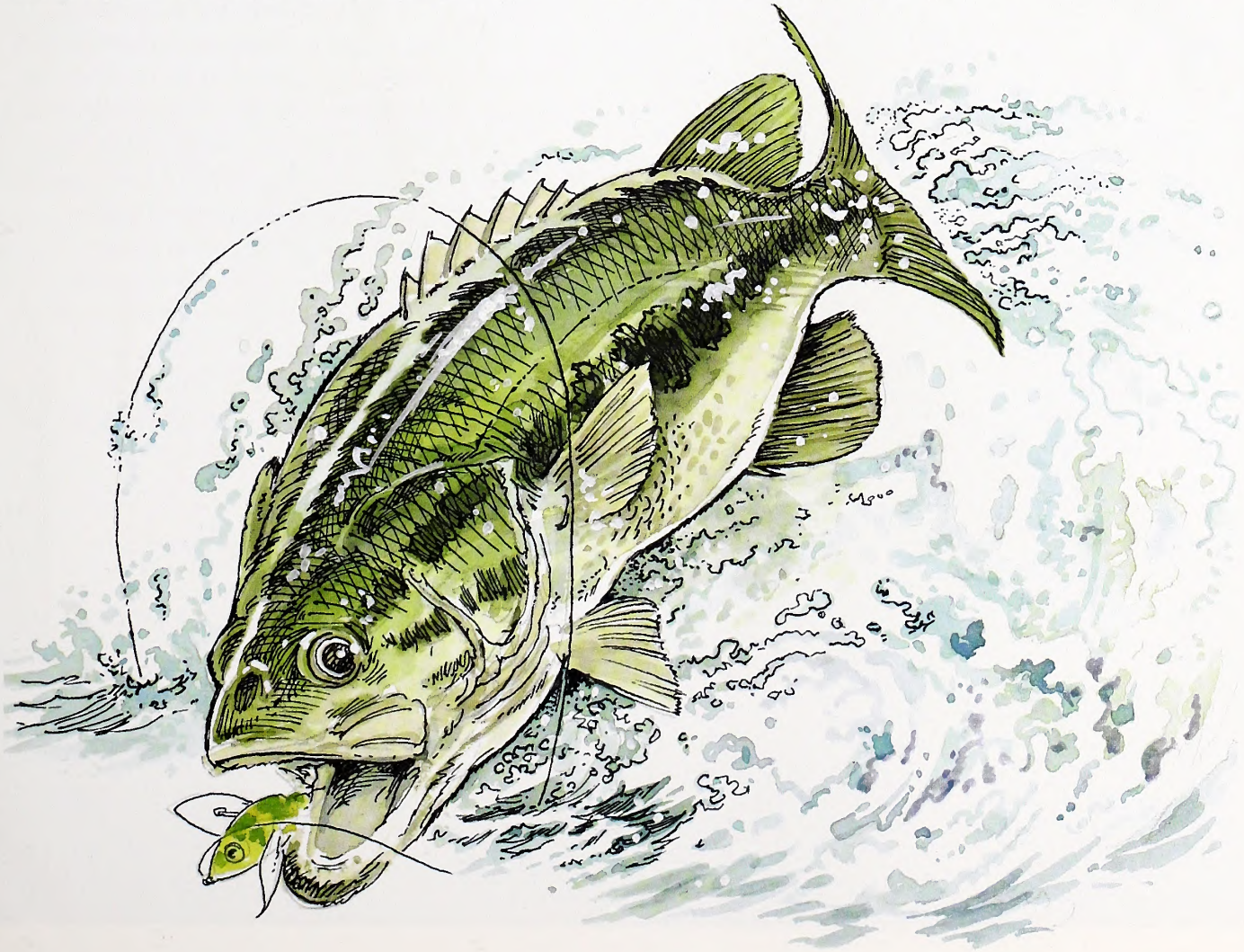
"I wonder," I said finally, "if that old game of Chinese checkers is still in there?"

Charlie laughed quietly. "You're not going to try to go in and look, I would hope. Probably full of cottonmouths."

"Always was," I said. ⊠

▪ ▪ ▪

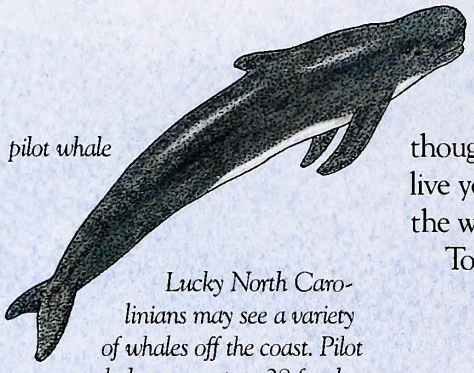
I saw the cabin—or rather where it had been—once more on a cold January morning duck hunt in the 1980s. Our guide agreed to swing by the marshy hook of the Little Alligator just before dawn so I could have a quick look. Even in the dim light, it was apparent that the cabin and its outbuildings had finally settled for good beneath the dark water.



Sure, they're big and powerful. They can swim far and dive deep. But

What's So Great About Whales?

written by Julie Dunlap ©2000 */ illustrated by Consie Powell* ©2000



pilot whale

Lucky North Carolinians may see a variety of whales off the coast. Pilot whales grow up to 28 feet long compared to sperm whales which reach lengths of 69 feet. Both are toothed whales. Right whales and humpback whales both reach lengths of about 60 feet. Using their huge plates of baleen, humpbacks feed on plankton and small fish, while right whales eat primarily plankton.

WHAT ARE WHALES?

Like wolves, deer and humans, whales are mammals. Though people once thought they were fish, whales breathe air, are warm-blooded and give birth to live young. In fact, their early ancestors lived on land. Over millions of years in the water, early whales lost their back legs, and their front legs became flippers. Today's whales have streamlined bodies, perfectly adapted to life at sea.

About 76 species of whales, in all shapes and sizes, have been identified so far. Scientists divide them into two main groups—toothed whales and **baleen** whales. Toothed whales have sharp teeth for catching fish, squid and other prey. Sperm whales, beaked whales, dolphins and porpoises are all toothed whales. Instead of teeth, baleen whales have bristly plates of baleen (also called whalebone) hanging from their upper jaws. A baleen whale swims open-mouthed through a feeding area, trapping sea water that's soupy with small schooling fish or finger-sized invertebrates called **krill**. The whale's tongue squeezes out the water, but the baleen catches the fish or krill like a sieve.

sperm whale

SEA SONGS

Even huge animals may feel small and alone in the vast ocean. How do they keep in touch with each other? Whales make a variety of sounds to communicate including those to warn about dangers, to threaten enemies and to call family members. Belugas make so many noises—squawks, rattles, moos, clangs, shrieks—that sailors called them "sea canaries." The champion whale singers, though, are male humpbacks. Humpbacks at their breeding grounds sing an eerie melody of moans, whistles and roars day and night, pausing only to breathe.

SPECIAL TALENTS.

Some whales have another amazing talent. Like bats, they "see" with their ears. Dolphins and other toothed whales use a sound wave system called **echolocation**. A whale makes high-pitched clicks in its nasal passages that bounce off objects in the water. By listening to the echoes, the whale learns if fish, sharks, rocks or sandbars are nearby. Echolocation allows beaked whales to hunt in dark ocean depths and river dolphins to fish in some of the world's muddiest waters.

MIGHTY MIGRATIONS

One of the best times to see whales is when they **migrate**. Many species travel seasonally to their feeding and breeding grounds. Baleen whales stuff themselves all summer in cold, krill-rich polar seas. By fall, they've stored enough fatty **blubber** for a long trip back to the warm, tropical seas where they were born. It's a safe place to give birth and mate, but there's little to eat. By spring, the hungry whales head back toward their polar summer homes.

Migrating whales often hug the coast, passing the same places year after year. Humpbacks regularly migrate past North Carolina shores, south in December and January and north in March and April. Sperm whales, right whales, pilot whales and other species have also been spotted migrating near the Outer Banks.

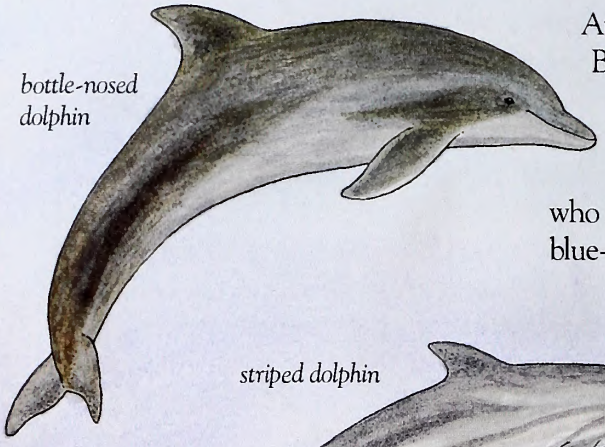
humpback whale

right whale

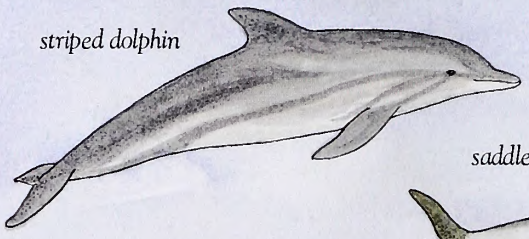
BIG TROUBLE

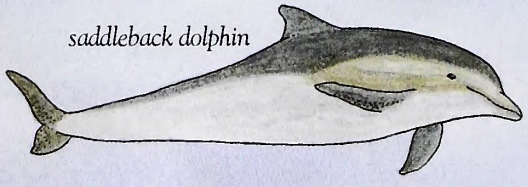
Every year on beaches around the world, thousands of whales run aground, or **strand**, alone or in groups. Many wash ashore dead, but others appear healthy when they arrive. Were they lost? Caught in a storm? Did a predator frighten them into shallow water? Were they following a tired or sick leader and became trapped at low tide? Why whales strand is one of the great mysteries of the animal kingdom.

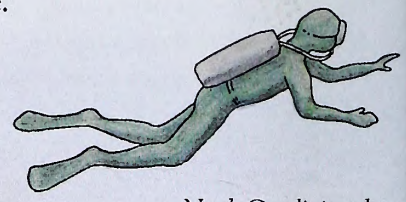
Finding a stranded whale was great luck for ancient people. They used every scrap of the carcass for meat, oil and bones to carve tools. About a thousand years ago, people learned to hunt whales from small boats. Whaling ships grew bigger and bigger as people demanded more whale products — oil for lamps and lubrication, soap and crayons from blubber, and corsets, buggy whips and umbrella stiffeners from baleen. North Carolina whalers readied their boats on shore, waiting for a lookout to shout, "Thar she blows!" Most whalers, though, sailed on months-long voyages, killing whales until every oil barrel brimmed full. Faster ships and more powerful harpoons, invented in the 1860s, made the killing so easy that many species were in danger of disappearing.



At last, most countries agreed to ban commercial whaling by the 1980s. Boats near whales these days are usually packed with whale-watchers. People who get close to live, wild whales never forget the experience. Back home, they remember to fight against oil spills, chemical pollution and other threats to whale populations. After all, people who know whales—from the smallest porpoise to the gigantic blue—know they deserve a great future.







North Carolinians have a good chance of seeing dolphins swimming near shore. Some kinds even fish in the sounds and coastal rivers.

What Does It Mean?

baleen: fringed structures in a baleen whale's mouth used to filter food from the water. They are made from keratin (the same material as fingernails)

blubber: a thick layer of fat under the skin of sea mammals that helps keep the animals warm

echolocation: a system for detecting the size, shape and position of objects by sending out sound pulses and decoding the pattern of returning echoes

krill: shrimp-like invertebrates that are very common in some oceans

migrate: to travel seasonally a long distance, often to reach better feeding or breeding grounds

strand: to run aground, either on purpose or by mistake. This is usually fatal for whales

Read and Find Out

- *Gone-A-Whaling* by Jim Murphy, Carion Books, 1998.
- *The Whale Watcher's Guide* by Patricia Corrigan, NorthWord, 1999.
- *Whales, Dolphins, and Porpoises* by Mark Carwardine, Dorling Kindersley Publishing, 1995.
- *Whales and Dolphins* by Steve Parker, Sierra Club Books for Children, 1992.
- *Whaling Days* by Carol Carrick, Clarion Books, 1993.
- *Whaling on the North Carolina Coast* by Marcus Simpson Jr. and Sallie Simpson, North Carolina Department of Cultural Resources, 1990.

In *Wildlife in North Carolina*

- "Diamond City Whales" by Jim Dean, March 1982.
- "Whales on the Beach" by David S. Lee, May 1994.
- "Baleen and the Paradox of Size" by Lawrence S. Earley, February 1995.

Some websites about whales:

- Discovery Channel's Humpbacks of Madagascar: www.discovery.com/exp/humpbacks/hear.html
- Whale Club: www.whaleclub.com
- WhaleNet Educational Resource: www.whalenet.net/

Get Outside

Go Whale Watching: Boat tours, often led by naturalists, will take you to spots where whales feed or migrate. The whale-watching capital of the Atlantic Coast is Provincetown, Mass., but tour boats also leave North Carolina ports. The movements of large whales are unpredictable, but seeing bottlenosed dolphins is a pretty sure bet. And even if you don't spy whales, you'll learn about other sea creatures and glimpse the watery world whalers once knew. For information on local trips, contact the North Carolina Aquarium at Pine Knoll Shores, (252) 247-4004.

Adopt a whale: Many organizations invite the public to adopt whales for a small fee. You'll receive photos, fact sheets and up-to-date migration reports, and the group will use your contribution to promote whale research and conservation. For information on adopting a variety of speices, contact the American Cetacean Society, P.O. Box 1391, San Pedro, Calif. 90733-1391, phone (310) 548-6279 or http:/www.acsonline.org/.

Visit the Museum: Take a summer jaunt to the new N.C. Museum of Natural Sciences in Raleigh. Visit the coastal exhibits and compare your size to that of a whale from the inside out, as you view the wonderful whale skeleton. For more information, call (919) 733-7450.

Editing and design by Consie Powell. Art puzzle by Anne Marshall Runyon.

It's WILD!

Project WILD Activities for teachers and students that correlate to this topic include:

Changing Attitudes: teaches students to understand factors which may change attitudes towards wild animals or the environment.

Here Today, Gone Tomorrow: teaches students to identify and describe some causes for the endangerment or extinction of animal species.

When a Whale is a Right: teaches students about characteristics and status of whales, as well as how international relationships affect wildlife.

Whale of a Tail: teaches students about the sizes of different whales compared to their own body size.

Get WILD

Advanced WILD Workshops:

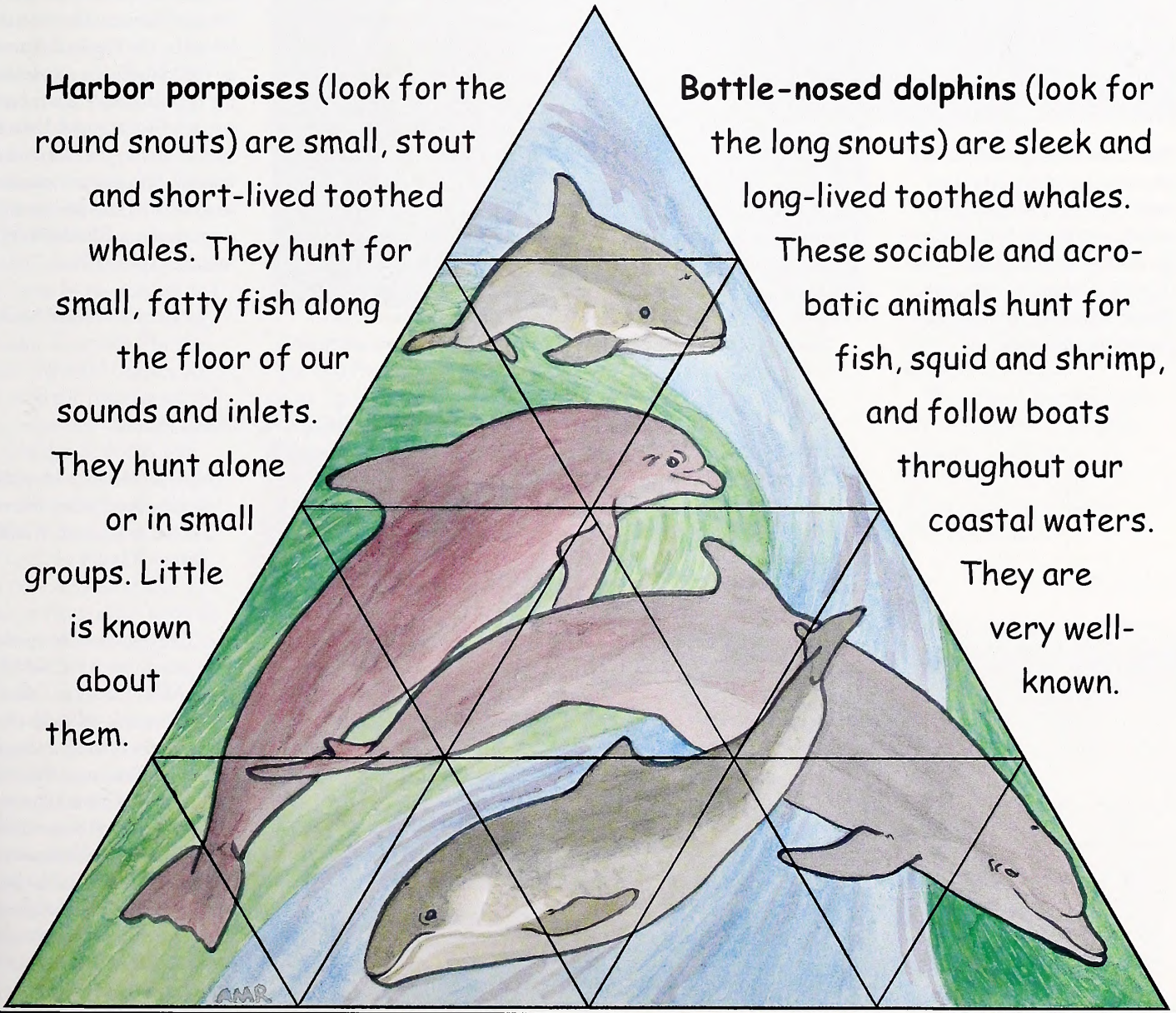
Sept. 29-Oct. 1 – *Endangered Species*, Mountain Trail Outdoor School, Kanuga. Contact Paul Bockoven (828) 692-9136.

A Pair of Toothed Whales in Our Sounds

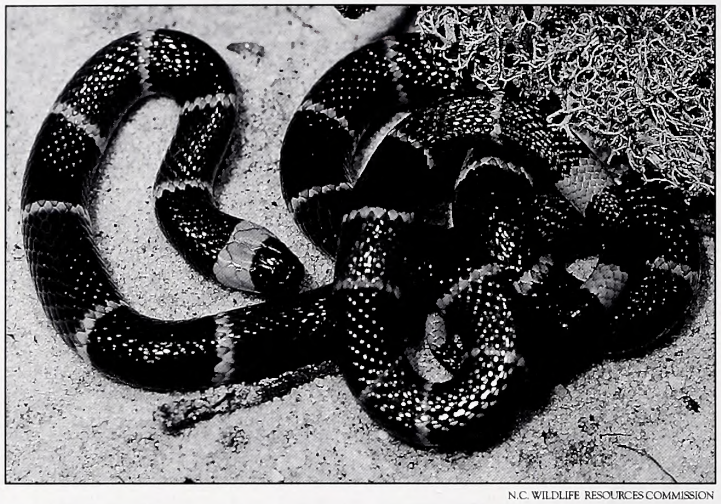
(Cut out the puzzle pieces along the black lines, and reassemble it.)

Harbor porpoises (look for the round snouts) are small, stout and short-lived toothed whales. They hunt for small, fatty fish along the floor of our sounds and inlets. They hunt alone or in small groups. Little is known about them.

Bottle-nosed dolphins (look for the long snouts) are sleek and long-lived toothed whales. These sociable and acrobatic animals hunt for fish, squid and shrimp, and follow boats throughout our coastal waters. They are very well-known.



North Carolina's List of Protected Species Updated



N.C. WILDLIFE RESOURCES COMMISSION

***The Eastern coral** snake (shown above) is one of four venomous snakes recently granted a protected status by the N.C. Wildlife Resources Commission. More than 50 other species were also designated as endangered, threatened or special concern.*

The N.C. Wildlife Resources Commission recently approved changes in the status of more than 50 species on the state's list of endangered, threatened and special concern species.

Drawing the most attention was the addition of four venomous snakes. The diamondback rattlesnake and the coral snake were added to the endangered species list. Also, the timber rattler and Carolina pygmy rattlesnake were added as species of special concern.

Slated to take effect pending ratification by the legislature during their 2001 session, the designations will make it illegal to collect or kill the four snakes unless they are perceived as a threat. However, researchers will be allowed to apply for permits to collect the snakes.

David Cobb, chief of the Wildlife Commission's Division of Wildlife Management, said these designations will offer the four snake species a much-needed level of protection.

"The populations of these four snake species are so low that the chances of someone coming across one is fairly remote," Cobb said. "Giving these snakes a protective status will enhance conservation of these species."

In addition, a number of amphibians, birds, fish, mollusks and crustaceans were also designated as endangered, threatened or special concern. The state endangered species list was established by the General Assembly in 1987 in response to declining populations of many native species. Slightly more than 200 species are on the North Carolina list. Species have declined as a result of habitat loss and degradation, pollution and commercial exploitation.

—Bodie McDowell

Edited by Chris Powell

Magazine Subscription Sales Go Statewide

***Look for this** poster hanging at sporting goods stores that now sell subscriptions to* Wildlife in North Carolina.

To provide one-stop shopping, the N.C. Wildlife Resources Commission recently added *Wildlife in North Carolina* magazine subscription sales to the list of items available at businesses that sell hunting and fishing licenses or boat registrations.

When purchasing licenses or registrations, customers now can add a new wildlife magazine subscription to their transaction. Subscribers will then begin receiving their magazine within six to eight weeks.

"By including license agents in the magazine-marketing process, more than 1,000 businesses statewide will be assisting us in educating the public about wildlife conservation," said Sherry Outlaw, sales and marketing coordinator for *Wildlife in North Carolina*. "We believe this will help us reach a much wider audience."

One-year, three-year and lifetime subscriptions will be available at license-sales locations. However, subscription renewals must be done either through a form located in the magazine, or by calling 1-888-248-6834.

—Chris Powell

Cumberland County Ducks Unlimited Chapter to Hold Youth Event

Children, fish and fun. What could be better ingredients for the Cumberland County chapter of Ducks Unlimited's 10th Annual Greenwing event, to be held Sept. 24?

The fishing event will take place from 2 to 5 p.m. at the N.C. Wildlife Resources Commission's Lake Rim Fish Hatchery, near Fayetteville. Admission is $20 per child, and each participant will take home a fishing rod and reel, a T-shirt, a hat and a year's membership to Ducks Unlimited, which includes a subscription to the organization's magazine. Food and drinks will also be provided.

The Wildlife Commission uses the Lake Rim Fish Hatchery to raise bream, catfish and largemouth bass for stocking. All tackle is provided by the Ducks Unlimited chapter, and each child will have access to what—that day—could be the best fishing hole in the state.

"After the wildlife officers go over some safety briefings, the children will receive a rod and reel, some bait and they and their parents will be able to go fish in the ponds," said Lee Warren, state sponsor chairman for the North Carolina chapters of Ducks Unlimited. "We use only barbless hooks and the fishing is catch-and-release."

Wildlife Commission personnel will be on hand to help children bait hooks and release fish. Also, wildlife officers will be manning a BB gun shooting range where firearms safety will be taught.

The Cumberland County chapter of Ducks Unlimited, with numerous contributions from local businesses, has hosted the Greenwing event at the Lake Rim Fish Hatchery for the past six years. The event actually costs the chapter $38 per child. Last year, more than 250 children attended, and a separate free event was held for children from the Falcon Children's Home, an orphanage located near Fayetteville.

CHRIS POWELL

***Marshall Ray, with** the Wildlife Commission's Division of Engineering Services, assists a young fellow who caught a catfish at last year's Green Wings event in Cumberland County. Also present at last year's event were the following Ducks Unlimited representatives (bottom): Lee Warren, DU state sponsor chairman; David Carter, district chairman; Chuck Wall, state president; David Schuessler, regional director; Lee Norris, Greenwing chairman and Don Manley, senior regional director.*

Warren added that it is the relationship with the Wildlife Commission and its chairman which has made the program such a success.

"Wildlife Commission Chairman John Pechmann has played a crucial role in the success of our Greenwing program in Cumberland County for the past eight years," Warren said. "Ducks Unlimited is the largest environmental organization in the world, and more than 96 percent of all funds raised by Ducks Unlimited goes directly to programs like Greenwing and obtaining wetlands for our future."

The event is limited to the first 500 children. To register, call David Coffman, area chairman of the Cumberland County chapter of Ducks Unlimited, at (910) 424-4060.

—Chris Powell

CHRIS POWELL

Water Pressure

Dear Wildlife:

I was encouraged to read the article "Making Waves" in your May issue, which covered the new laws created by the North Carolina General Assembly for personal watercraft or Jet Skis. Requiring operators to be at least 16 to drive alone will prevent many accidents. Children do not need to be flying around a lake at 50 mph by themselves. The 100-foot buffer law will also prevent many injuries caused when someone on a Jet Ski hits someone swimming. These new laws will also relieve frustration that some Jet Ski users cause fishermen and boaters using traditional craft. Jet Ski users are not the only problem though; conventional boat users cause accidents, too. These new laws will help make the waters safer for all boaters.

—Andrew Flynt, Lewisville

North Carolina Outdoor Calender of Events

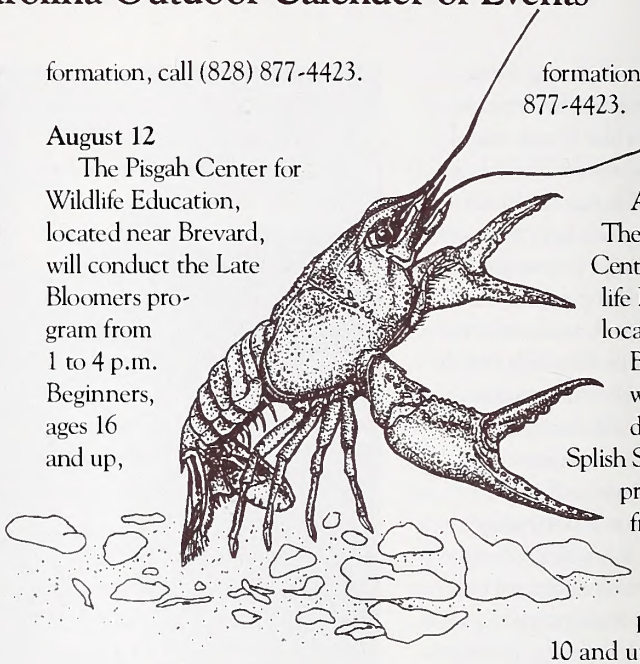
On several occasions, events in this calendar have been changed without notice. Readers should check with the contact listed before traveling to an event. Items for listing should be conservation oriented and should be sent at least four months in advance.

August 9

The Pisgah Center for Wildlife Education, located near Brevard, will conduct the Nature Nuts - Snakes program from 1 to 3 p.m. Nature Nuts is a program series for young children, ages 3 to 7 and their parents or guardians. Each program focuses on a different wildlife theme and includes stories and activities that engage children with the natural world. For more information, call (828) 877-4423.

August 12

The Pisgah Center for Wildlife Education, located near Brevard, will conduct the Late Bloomers program from 1 to 4 p.m. Beginners, ages 16 and up, will learn to identify late summer wildflowers using *Newcomb's Wildflower Guide*. The guide is available for purchase at the wildlife center. For more information, call (828) 877-4423.



August 19

The Pisgah Center for Wildlife Education, located near Brevard, will conduct the Splish Splash program from 9 a.m. to noon. Participants, ages 10 and up, will learn to identify aquatic organisms. They will also build their own collecting net and use it to collect stream critters. For more information, call (828) 877-4423.

On Patrol

Editor's note: *Listed below is a report of a situation that exemplifies the unpredictable nature of North Carolina wildlife enforcement officers' and biologists' duty.*

Sgt. John Cambell Jr. and Wildlife Commission biologists David Sawyer and Don Hayes recently responded to an Ashe County report of a nuisance bear. The 300-pound bear had broken into a residence a couple of nights before and had helped himself to all the food in the refrigerator. The plan was to stand by and wait for someone in the neighborhood to call when the bear began its evening chow run. The wildlife team—armed with a live bear trap, a supply of sweets and a tranquilizer gun—would then rush to the scene.

When the call came, the wildlife threesome responded and immediately began trying to lure the bear into the trap with marshmallows. A group of neighbors gathered a safe distance away to watch the spectacle. When the bear refused to go inside the trap, Campbell kept the bear close by tossing him more marshmallows and other sweet items, while Hayes and Sawyer prepared the tranquilizer gun.

Sawyer scored a perfect shot on the bruin, which began to run up a nearby hill. Campbell proceeded to chase after the bear, throwing marshmallows its way. Overcome by the treats, the bear stopped and followed the trail of goodies back, collapsing within 10 feet of the trailer. The neighbors all agreed that the wildlife crew and bear had put on quite a show.

Tourney Winners Announced

West Davidson High School and Forbush Middle School won the overall championships in the recent North Carolina Hunter Education Tournament, held at the John F. Lentz Shooting Complex, near Ellerbe.

Scores are based on rifle, shotgun and archery competitions as well as hunting skills. Out of a possible 3,200 points, West Davidson High School scored 2,914 to edge past Jones County High School in the senior championship. In the junior championship, Forbush Middle School scored 2,798 points, followed by Ridgecroft Middle School with 2,682 points and Jones County Middle School.

Josh Goodnight, of West Rowan High School, achieved the highest overall score in the senior competition with 745 points. Valerie Matthews, with the Forbush Middle School "B Team," came in second place with 713 points, and Clint Grubb, of West Davidson Middle School, came in third with 708 points.

In the junior competition, Josh Butler, of Forbush Middle School, captured the highest individual overall trophy with 723 points. Michael Huffman, also of Forbush Middle School, came in second with 722 points, and Mac Griffin, of Ridgecroft Middle School, came in third with 683 points.

—Bodie McDowell

Sport Fish Restoration Program Celebrates 50th Anniversary

On Aug. 9, the Federal Aid in Sport Fish Restoration program will celebrate 50 years of state and federal partnerships that work to restore and manage recreational fisheries and provide opportunities for anglers and boaters.

Modeled after the Pittman-Robertson Act, the fisheries restoration act—commonly referred to as the Dingell-Johnson Act—was passed on Aug. 9, 1950 to create a parallel program for management of fishery resources, conservation and restoration.

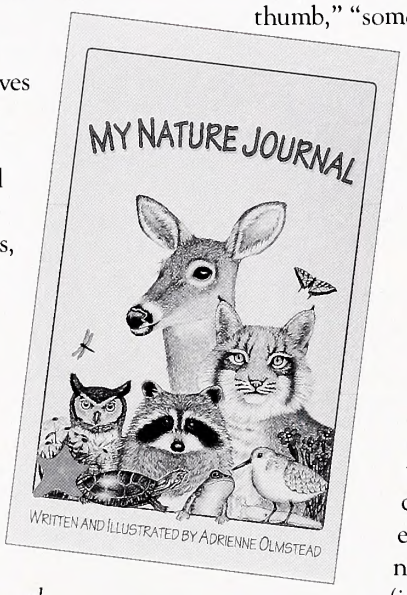
The program is funded by money collected from the manufacturers of various fishing tackle. An amendment in 1984—the Wallop-Breaux Amendment—added a new provision to the act by extending the excise tax to previously untaxed items of sporting equipment.

Each state's share of the revenue is based 60 percent on its license anglers and 40 percent on its land and water area. State programs, approved by the U.S. Fish and Wildlife Service, are reimbursed 75 percent of the project's cost.

—U.S. Fish and Wildlife Service

Book Review: *My Nature Journal*

My Nature Journal: A Personal Nature Guide for Young People, by Adrienne Olmstead (Pajaro, 2000). Black and white illustrations; hardback. $17.95.



With their after-school lives dominated by the computer and a frenzied series of organized activities, children have less and less time to discover the natural world around them.

In her book, *My Nature Journal: A Personal Nature Guide for Young People*, Adrienne Olmstead has provided at least part of the solution—a series of activities aimed at getting children, ages 8 to 14, outdoors where they can stop, look and listen.

Olmstead has organized her book around five subject areas—woodlands, meadows, ponds and streams, seashore and twilight. Her simple activities can be done in backyards or neighborhood parks. In "Woodland Scavenger Hunt," for example, a child is instructed to find "something smaller than your thumb," "something that needs air," "something with spots." All of these exercises can help children begin to focus on the tiniest details of the natural world.

There are activities intended to help children discover interesting natural things (insects under leaves, shells on a beach). Other activities are designed to help them understand ecological principles or to capture what they've learned in a story or a sketch.

Most important, the book also encourages parents to use the book together with their child, thus strengthening these early connections to the natural world.

Clarification

Unintentionally, two cooperators were not acknowledged in an article about ruffed grouse research, which ran in the Back Porch section of the June issue of *Wildlife in North Carolina*. The U.S. Forest Service and the N.C. Ruffed Grouse Society continue to provide significant funding toward completing this important research.

Catch Us at These Numbers

- **1-800-662-7137** to report violations of hunting and fishing laws.
- **1-800-628-3773** (NC VESSEL) for boat registration and titling.
- **1-800-675-0263** for hunting dates and shooting hours for migratory game birds.
- **1-888-248-6834** (2HUNTFISH) to purchase most licenses and *Wildlife in North Carolina* magazine subscriptions with VISA or MasterCard.
- **1-800-446-8663** (I GOT ONE) to report big game harvests.
- Connect to the Commission's online web site at **http://www.state.nc.us/Wildlife/**

The N.C. Wildlife Resources Commission maintains five toll-free telephone numbers to provide better services and convenient access to information for North Carolina citizens. Calls are answered in order, but some numbers may require a wait during busy seasons.

VISA MasterCard

Wildlife Endowment Fund Report

Totals Through May 2000

Principal Balance
$30,062,952.53

Interest Earned
$30,758,889.16

Total Receipts
$60,821,841.69

Interest Used
$20,436,178.04

Fund Balance
$40,385,663.65

Established on May 29, 1981, this fund is derived from the sale of lifetime hunting and fishing licenses and lifetime subscriptions to *Wildlife in North Carolina* magazine as well as from tax deductible contributions. While the interest may be used to supplement N.C. Wildlife Resources Commission programs, the principal remains invested to generate additional interest for the future.

Summer Reminders

by Rodney Foushee

With the dog days of summer upon us, there are still plenty of things to remember when it comes to fish and wildlife.

Recycling Fish: With dissolved oxygen levels generally at their lowest this time of year, fish are much more susceptible to heat-induced stress and shock. That means that you need to take extra care if you plan to practice catch-and-release fishing. If possible, avoid handling fish you plan to release and return them to the water immediately. A pair of forceps or needle-nosed pliers can help in hook removal and minimize fish handling.

If you must handle a fish, make sure you wet your hands first and avoid squeezing the fish. If the fish is deeply hooked, cut the leader as close to the hook as possible before releasing. Also, avoid tossing fish back. Instead, lower the fish gently into the water and revive it if necessary by moving the fish back and forth to pass oxygen over its gills.

Mowing Dove Fields: If you want to have plenty of doves to hunt come Opening Day, you'll need to mow down food plots on your land this month. Plan on mowing millet and sunflowers around Aug. 15. to give the birds a few weeks to find your fields. You can also mow the fields a second time about a week before Opening Day to further improve hunting.

To keep doves in your fields once the hunting season starts, don't hunt them more than once a week. Also, try to avoid shooting over them in the late afternoon.

Though hunting doves over mowed fields is perfectly legal based on recently updated federal baiting laws, you can't hunt waterfowl over crops that have been mowed or otherwise manipulated. And no matter what bird you plan to hunt, you cannot scatter additional seed on top of planted fields.

Rabies Prevention: With the approach of hunting season, now is an excellent time to update rabies vaccinations for your dogs. Considering North Carolina is in the grips of a rabies epidemic, yearly vaccinations are not only the law, they also make excellent sense to protect you and your pets against this deadly disease. Since hunting dogs are especially likely to encounter rabid raccoons and foxes while afield, this is one reminder you shouldn't ignore.

N.C. WILD STORE

Dazzling Butterflies

We've chosen a brilliant selection of rare and common butterfly species for our newest posters. Seventeen common butterflies and 19 rare species, in all their radiant color, adorn the posters. Range maps depict where each butterfly is found, and informational text highlights the connections between the butterflies and their habitats.

Common North Carolina Butterflies

What's the wing span of a Question Mark butterfly? Learn this and much more from this educational poster. 22" x 34". $8.

ITEM CODE **P15**

Rare North Carolina Butterflies

Learn why these species are considered rare or endangered. 22" x 34". $8. ITEM CODE **P16**

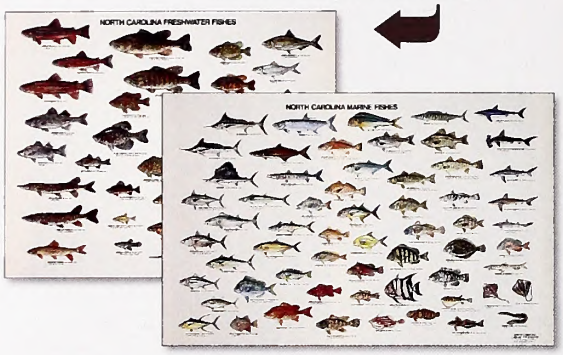
Butterfly Posters Set

Buy both posters and save! **$14.** ITEM CODE **P17**

All proceeds from the sale of these products support the development and production of conservation education projects and programs.

N.C. WILD STORE

North Carolina's freshwater fish and marine fish are colorfully displayed on individual posters, and feature the art of Duane Raver. Reel yours in today!



Fishes of North Carolina

Set of 2. Freshwater fish poster shows 36 state species (size 28" x 22½"). Marine fish poster shows 60 species (size 35" x 22½") $10.

ITEM CODE **P9**

Nature's Ways Collection

Explore the wonders of the natural world, wildlife species and ecosystems through "Nature's Ways." More than 200 essays from *Wildlife in North Carolina* have been compiled in a beautiful 6-volume paperback set. $27.50.

ITEM CODE **M9**

Also available as a boxed set. $30.

ITEM CODE **M10**

Before going on your next outdoor hike or camping trip, be sure you know North Carolina's reptiles.

Reptiles of North Carolina

Set of 4 posters in full color. Each poster decribes the species and denotes which reptiles are on the endangered, protected or special concern list. A set includes: lizards, turtles, and both live-bearing snakes and egg-laying snakes. Posters are sized 22" x 34". $18. ITEM CODE **P10**

Amphibians of North Carolina

The Hylid Frogs. North Carolina's tree frogs, cricket frogs and chorus frogs, belonging to the large family *Hylidae*, are presented in this colorful poster, one of two frog posters in the Amphibians series. 22" x 34". $6.

ITEM CODE **P11**

Amphibians of North Carolina

True Frogs and Toads. The second poster in the Amphibians series showcases true frogs and toads. Vibrant photos combine with informative text to make it a standout in the classroom or at home. 22" x 34". $6.

ITEM CODE **P14**

Waterfowl Decoys of N.C.

Nineteen classic waterfowl decoys from North Carolina's legendary days of waterfowl hunting have been collected for the first time on this framable, high-quality poster. This is the first in a series of "Sporting Heritage" posters. 22" x 34". $10.

ITEM CODE **P12**

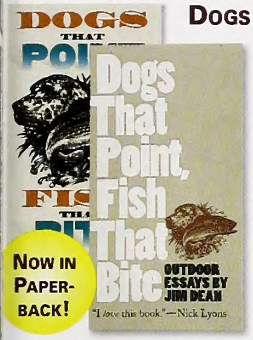
Traditional Trout Flies of the Southern Appalachians

Sixteen traditional trout flies are presented in stunning color detail. Each fly is accompanied by a brief history of its development and use in Appalachian waters as well as the components that make up each hand-tied creation. Second in a series of "Sporting Heritage" posters. 22" x 34". $10. ITEM CODE **P13**

Bird Houses & Feeders: How to Build and Enjoy Them

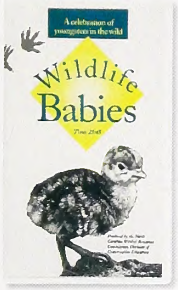
An eight-page illustrated guide to building bird houses and feeders. $2.

ITEM CODE **M6**



Dogs that Point, Fish that Bite

Here are 50 of the best "Our Natural Heritage" columns written by Jim Dean for *Wildlife in North Carolina* over the past 17 years. Published by the University of North Carolina Press and the N.C. Wildlife Resources Commission. 220 pages. Hardbound $19.95. ITEM CODE **M8**
Paperback $10.95. ITEM CODE **M12**



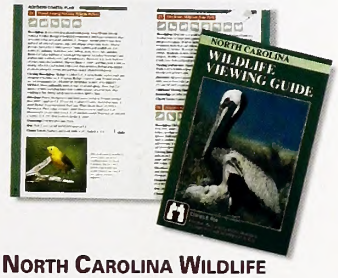
Magazine Binder

Store 12 issues of *Wildlife in North Carolina* in a sturdy binder. $10.
ITEM CODE **M2**

Wildlife Babies Video

Entertaining 25-minute video version of the classic 1965 Jack Dermid film reveals springtime antics of young wood ducks, black bear, possums, cottontails and others . $20.
ITEM CODE **N9**

Based on Chief Seattle's 1855 speech, the film's focus is on environmental ethics. Accompanied by This Land Is Sacred, this film is a must-see for everyone. It is destined to become a classic.



North Carolina Wildlife Viewing Guide

From Cape Hatteras to the Great Smokies, *North Carolina Wildlife Viewing Guide* will lead you to 90 of the state's premier wildlife viewing locations—and better your chances of seeing wildlife once you get there. $5.95. ITEM CODE **N6**

All Things Are Connected

Video and Activity Guide. $22.
ITEM CODE **W3**

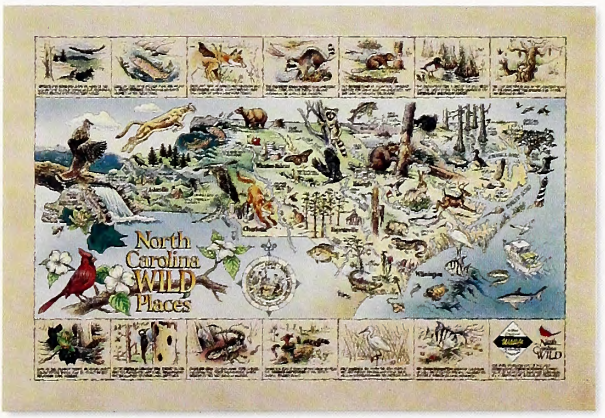
Gardens for Butterflies

Article reprint from *Wildlife in North Carolina* magazine for the gardener who wants to attract some of nature's most colorful creatures. $2. ITEM CODE **M5**

Scouting Correlations

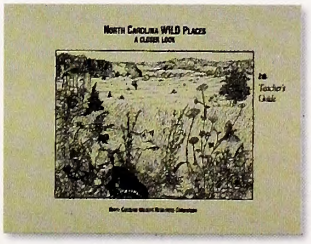
Cub, Boy and Girl Scout requirements are correlated to Project WILD and Aquatic WILD activities. Supplements Scout leaders' planning materials and events. Each $3.
Cub & Boy Scout Correlation. ITEM CODE **E9**
Girl Scout Correlation. ITEM CODE **E10**

North Carolina's wildlife habitats come alive in this 82-page, easy-to-read, soft cover book. With delightful illustrations by Anne Marshall Runyon, N.C. WILD Places covers 13 habitats across the state.



North Carolina WILD Places: A Closer Look

Book and Posters Set. With each book you'll receive two habitat posters (also by Runyon) and a N.C. WILD Places Map poster, featuring the art of Jackie Pittman. $16. ITEM CODE **E6**



North Carolina WILD Places Teacher's Guide

For teachers using *North Carolina WILD Places* in the classroom, these activities and games will heighten student awareness of wildlife habitats. $6.
ITEM CODE **E7**

More terrific items ☛

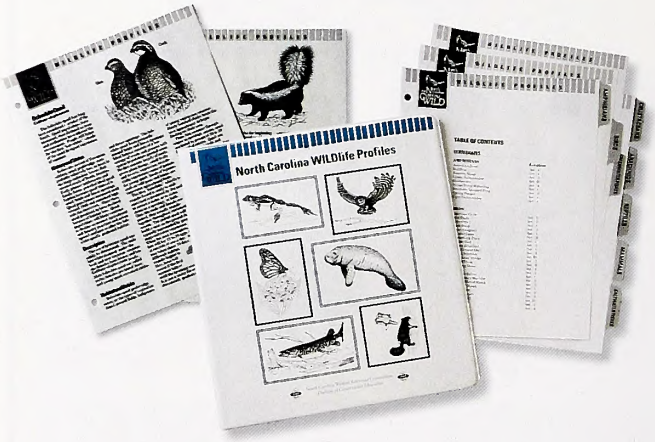
N.C. WILD STORE

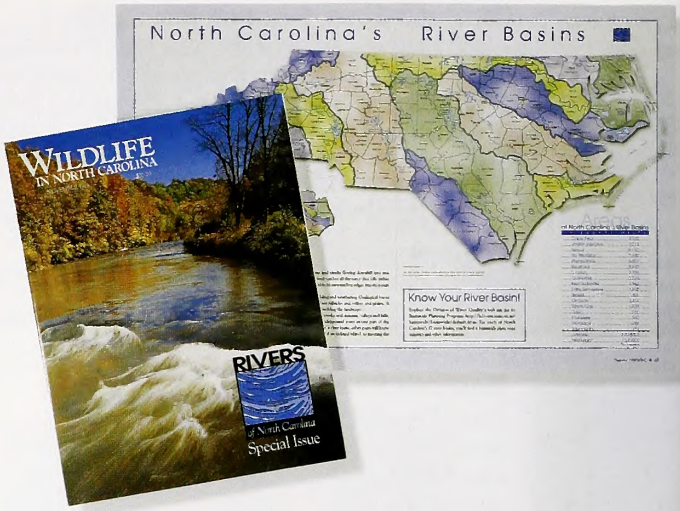
N.C. WILDLIFE PROFILES BINDER & N.C. WILDLIFE PROFILES SETS 1-12

This top-quality 3-ring binder includes:

- 120 illustrated fact sheets, each profiling an animal's history, status, habitat and behavior, and also containing a range map.
- Tab dividers that organize 12 sets of wildlife fact sheets by class.
- A table of contents, index and instruction sheet.

$30. ITEM CODE **W17**





RIVERS OF NORTH CAROLINA

This 128-page special issue of *Wildlife in North Carolina* examines issues relating to North Carolina's rivers, from canoe trips to water-quality to the real-life stories of people working to save our rivers.

For timely coverage of all of North Carolina's river basins, as well as eye-catching photos and educational maps and graphics, there's nothing else like it on bookshelves anywhere. Order "Rivers of North Carolina" for your own bookshelf, or give it to friends and family members to enjoy. For $10, plus shipping and postage, you'll have a coffee-table edition that's already being hailed as a classic. $10. ITEM CODE **M11**

EMBROIDERED CAPS

North Carolina WILD Cap. N.C. Wild cardinal on brushed-cotton twill cap with a Velcro® closure. Two-tone cap is tan/forest green. $16.50. ITEM CODE **A1**

Wildlife in North Carolina Caps. Exclusive designs and magazine logo are featured on three different cap styles. $16.50 each.

- Brook trout on sage-colored, brushed cotton cap with an unstructured front, extended bill, and nubuck suede closure. ITEM CODE **A3**
- Deer silhouette on Advantage® Camouflage cotton cap with tan suede bill. ITEM CODE **A6**
- Deer silhouette on blaze orange cap with brown waxcloth bill. ITEM CODE **A7**

PISGAH CENTER FOR WILDLIFE EDUCATION T-SHIRT

100% cotton natural color tee with design on back and Pisgah logo on front. $14.50.
ITEM CODES:
A8MED (medium)
A8LRG (large)
A8XLG (extra large)
A8XXL (extra extra large)

WEE TEES

Just like the adult shirt with Pisgah design, only smaller.
ITEM CODES:
A9XS (extra small; size 2-4) $10.
A9SM (small; size 6-8) $12.50.
A9MD (medium; size 10-12) $12.50
A9LG (large; size 14-16) $12.50.

WILDLIFE IN N.C. T-SHIRT

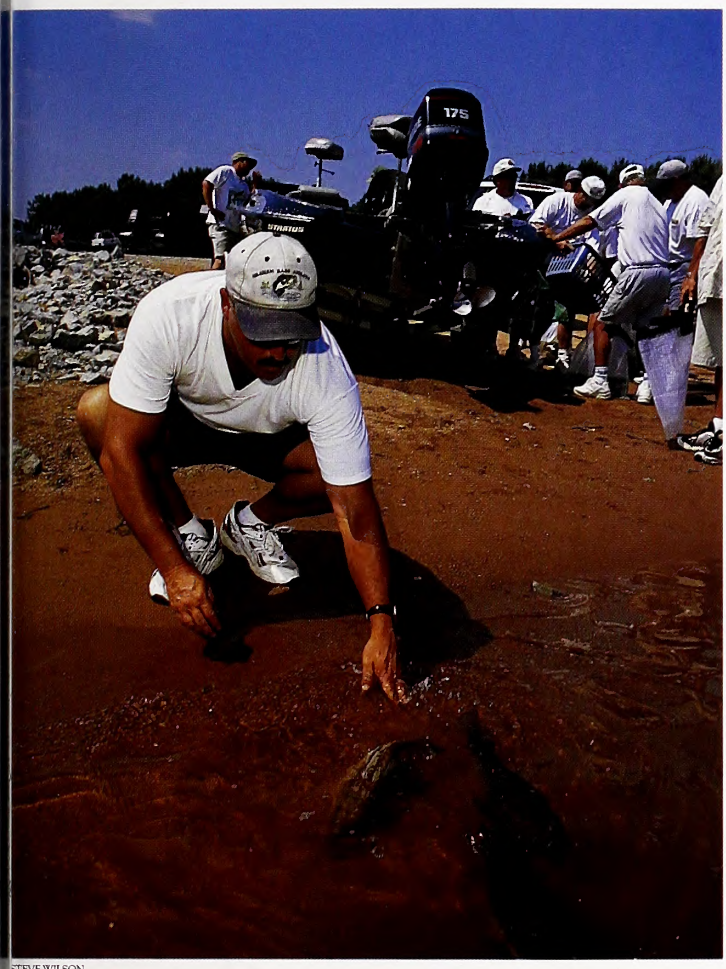
WINC magazine logo on front pocket. Tundra swan art on back. White.
$14.50. ITEM CODES:
A5MED (medium)
A5LRG (large)
A5XLG (extra large)
A5XXL (extra extra large)

N.C. WILD T-SHIRT

N.C. WILD logo printed on front and colorful art on back. White.
$14.50. ITEM CODES:
A4MED (medium)
A4LRG (large) ☛ SOLD OUT
A4XLG (extra large)
A4XXL (extra extra large)

WILDLIFE COMMISSION SPOTLIGHT

Get Your Boating Access Permits



STEVE WILSON

Thinking about holding a fishing tournament weigh-in or other event at one of the nearly 200 boating access areas across North Carolina? You'll need a special permit issued by the Wildlife Resources Commission.

The main purpose of these permits is to ensure that multiple events are not occurring at the same site to help manage congestion and maintain user accessibility. These permits are free and are mailed to an organization's contact person so that they will be available on-site during the special event or tournament weigh-in. These permits are issued on a first-come, first-served basis. And in order to guarantee that a boating access area is available, you need to make your request early.

KEN TAYLOR

So far this year, the Wildlife Commission's Division of Engineering Services has issued nearly 700 permits to various organizations for boating access areas across North Carolina. Currently, weigh-in permits that authorize fewer than 25 boats are issued as blanket authorizations and remain valid until January 31 of the following year. Also, the permit doesn't give the holder exclusive rights to the boat ramp—the public can still use the ramp.

If you need a weigh-in permit, you can call the Wildlife Commission's Division of Engineering Services at (919) 715-3155. Be prepared to provide an organization name, contact name, mailing address, boating access area name, body of water and a date for the requested event. If the event is a tournament weigh-in with fewer than 25 boats involved, you will not need to provide a tournament date nor location under the current guidelines.

***The Wildlife Commission** issues special permits for fishing tournament weigh-ins to help manage congestion and maintain access at public boating ramps.*

The Dinner Party

Crouched atop a black-eyed Susan, this crab spider waits for dinner to drop in. Crab spiders have the amazing ability to change their coloration to match the flower they are on. To learn more about the remarkable world of spiders, turn to page 4.

Periodicals postage paid at
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LITHOGRAPHY BY THE HICKORY PRINTING GROUP,
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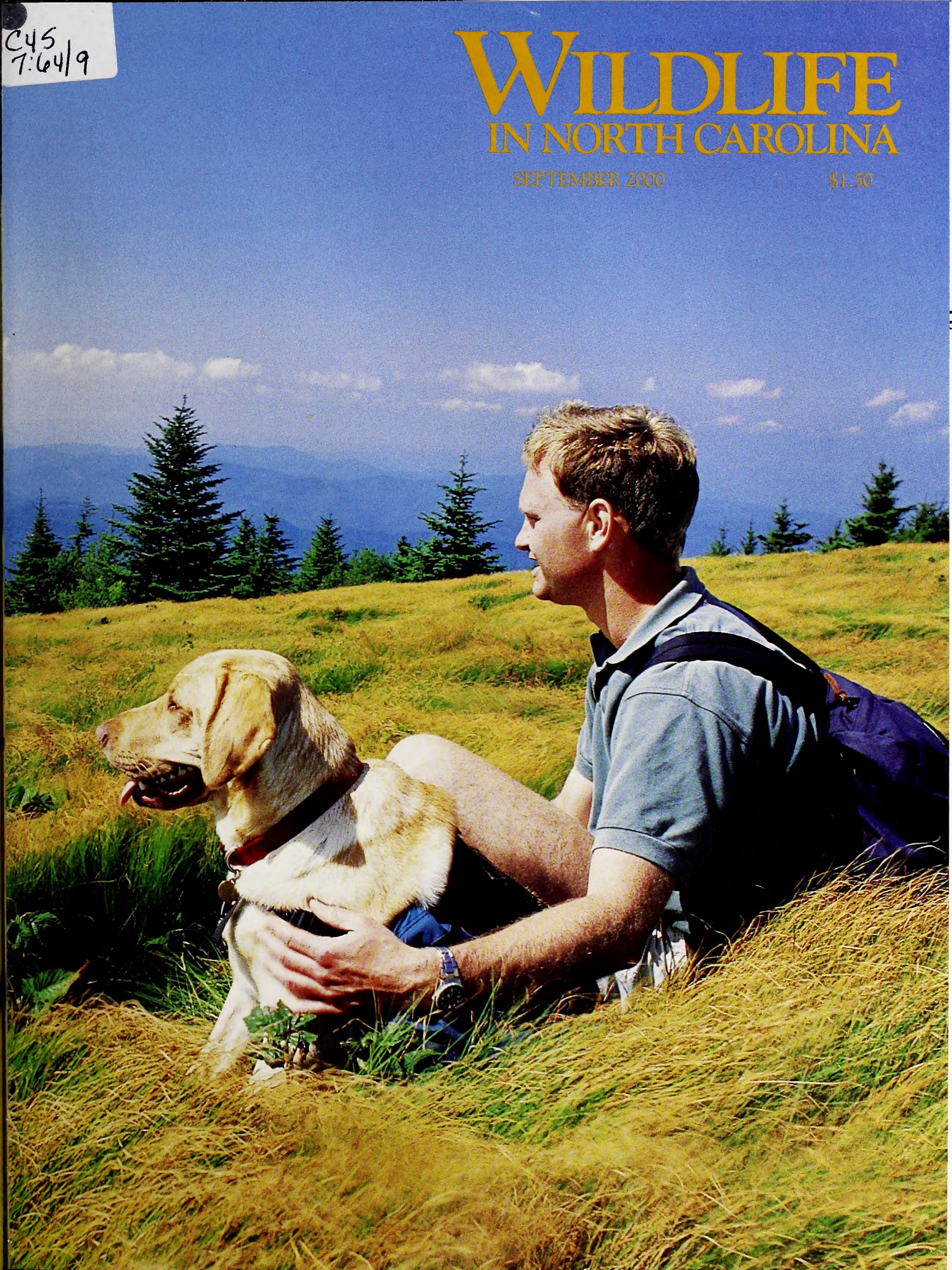
WILDLIFE IN NORTH CAROLINA

SEPTEMBER 2000 $1.50



Hit or Miss Doves

by Jim Dean ©2000

KEN TAYLOR

I like to carry my first cup of coffee out to the deck and read the newspaper on summer mornings while it's still relatively cool. Lately, however, I've been distracted by some of my avian neighbors. They sing from nearby trees or electric lines—it's more a soulful coo than whistle or chirp—or they waddle up and down the driveway picking up grit. This time of year the mourning doves around my house are corpulent and lazy, like the season. But occasionally, a pair will pass over high, their flight swift, jittery and erratic, reminding me that within a few days I will join other hunters in fields under a blazing September sun to attempt to transform a limit of these still abundant gamebirds into succulent, bacon-wrapped morsels roasted briefly over hot charcoal.

I am also well aware that I am no better prepared this year to gather the ingredients than in any previous year. Oh, sure, I have cleaned my shotgun and pulled my folding stool out of the basement. And I will soon be visiting the local sporting goods emporium to fill a grocery cart with shells from stacked pallets that crowd the aisles. Alas, the ammunition companies know me well—not personally, of course, but they know my ilk. We ilk constitute a sizable part of their annual profit margin, systematically converting each box of shells into, at best, three or four dove breasts. For a limit of doves, that works out to roughly four boxes per hunt. It doesn't help that we are acquainted with dove hunters who confidently go afield with a single box of shells and return with unfired shells, and a limit.

We invariably vow to improve our skills before the next season rolls around, but we've put it off again, haven't we? Still, we've got a whole season to improve the odds.

"The worst enemy of your first shot is knowing that you've got one or two more," he told me. "Practice with only one shell in the gun. That will make you focus on making that first shot count."

The most obvious step is to get in a little practice. Go to a local skeet, trap or sporting clays range and shoot a few rounds. I can tell a difference in my shooting—and confidence—even after a single round, especially if I haven't fired a gun since February. Years ago, my grandfather also gave me some helpful advice you might want to try. "The worst enemy of your first shot is knowing that you've got one or two more," he told me. "Practice with only one shell in the gun. That will make you focus on making that first shot count."

While some hunters are blessed with a natural gift for wing-shooting, most of us could also profit from some professional instruction. Swallow your pride and pay the range pro to give you a lesson or two. You may find out you've been violating several basic shooting rules.

In some cases, however, practice and instruction may not be enough. When I first began hunting years ago, it became obvious that not all my problems stemmed from poor basics or a lack of practice. My dad realized that my shotgun's stock was too short for me (learning whether your gun fits you is one of the things a competent instructor can determine). I also discovered that I had a dominant eye that might be giving me a persistently off-center sight picture. Eyeglasses helped—at the expense of a wonderful excuse, alas. If you suspect your vision isn't what it should be, get a checkup.

Among novices, especially, wing-shooting problems are often simply a matter of not choosing the most appropriate barrel length, gauge, choke or shells. Even if your gun fits you, you probably won't shoot your best if you're swinging 30-inch, full-choke barrels or an open-choked 26-inch barrel upland gun. Most experienced dove hunters go with 12-gauge, 28-inch barrels and modified choke. If you choose an autoloader, you're also less likely to flinch after you've burned several boxes of shells and bruised your shoulder with that pile-driving double you inherited. As for shells, most dove hunters have settled on 7½ shot as being nearly ideal for doves.

One other tip might be worth noting. When I first began dove hunting, I'd heard so much about establishing a lead that my grandfather finally decided I was actually shooting in front of many birds. "For close shots, forget about lead and point it at 'em," he told me. "But work on starting your swing from behind the bird and shoot just as your muzzle passes through the bird. It's like catching up with a baseball; just don't stop your swing as you shoot and you'll often automatically have just the right lead. Experience will teach you the proper lead for longer shots."

Trouble is, I never could hit a baseball, either.

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Wildlife in North Carolina is the official educational publication of the North Carolina Wildlife Resources Commission. It is dedicated to the sound conservation of North Carolina's wildlife and other interrelated natural resources and also to the environment we share with them.

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Wildlife in North Carolina (ISSN 0043-549X) is published monthly by the North Carolina Wildlife Resources Commission, 512 N. Salisbury St., Raleigh, N.C. 27604-1188. Periodicals postage paid at Raleigh, N.C. and additional mailing offices. Subscription rates: one year $7.50, three years $20, lifetime $100. All foreign subscriptions are $23.50 per year. For subscriptions from foreign countries, payment **only** by U S Postal Service money order or cashier's check drawn on a U.S. bank. All orders must be prepaid. Please allow 6 to 8 weeks delivery on new subscriptions and address changes. **POSTMASTER:** Send address changes to Circulation Manager, 1711 Mail Service Center, Raleigh, N.C. 27699-1711. Address all correspondence regarding subscriptions to Circulation Manager. If you have a problem with your subscription, dial (919) 662-4377. Articles in *Wildlife in North Carolina* may represent the personal views of authors, and do not imply endorsement by the North Carolina Wildlife Resources Commission. *Wildlife in North Carolina* is available on audio cassette as a courtesy of volunteer services of the Department of Cultural Resources, Library for the Blind and Physically Handicapped, Raleigh, N.C., (919) 733-4376. **The N.C. Wildlife Resources Commission is an equal opportunity agency.**

Galling Bugs

written by Phillip Manning ©2000
illustrated by David Williams

Galls are deformities that afflict almost every tree and plant species, from roses to redwoods. They come in an astonishing array of forms; some look like tiny red BBs, some resemble miniature pineapples, others are nutlike in appearance. To further complicate matters, almost anything can cause them, including insects, bacteria, viruses and fungi.

Fortunately, some galls are easily identified. Oak apples, for example, are hard, green spherical growths, 2 or 3 inches in diameter, that turn brown or red as they age. They can be found in North Carolina on scarlet and black oaks. They appear near the ends of twigs and are sometimes so numerous that the tree appears to be bearing a crop of undersized apples.

I have an oak apple gall in my office with a tiny round hole in its outer shell. The hole is the key to understanding the gall. Pliny the Elder mentioned these holes in 77 A.D. in his *Natural History*, but he had no idea what caused them. Cecidiology—the study of galls—has never been on science's front burner, so the answer didn't come for another 16 centuries, until Marcello Malpighi published *De gallis*. Malpighi determined that oak galls were the egg chambers of insects and that the holes were created when the critters hatched in the galls and chewed their way out.

Many gall-causing insects are solitary wasps of the family Cynipidae. Cynipid wasps are secretive creatures. Unlike the social wasps, such as yellow jackets, that build communal nests and defend them by stinging intruders, solitary wasps associate with neither their own kind nor any other insect. They don't have stingers or descriptive names. In fact, most of them don't even have common names. The wasp responsible for the oak apple galls in my office is known only by the unappetizing moniker *Amphibolips confluenta*.

A. confluenta is tiny, about one quarter inch long, but it is huge compared to some parasitic gall wasps. One of these, the oddly named *Alaptus magnanimus*, is the world's smallest insect, no bigger than the period at the end of this sentence. Because of their microscopic size and cryptic ways, gall wasps are some of the least-studied creatures in the animal kingdom.

In American universities, biologists studying gall wasps have little chance of getting a grant when their colleagues are after the same money to clone sheep or develop frost-resistant strawberries. One of the foremost scientists to study gall-causing insects was Alfred Kinsey, who didn't win fame until he changed fields and began researching the sexual behavior of humans. Consequently, much of the research into the lives of these creatures has been done in Great Britain, where science and scientists are a bit quirkier.

One of those quirky scientific Brits is Joy Spoczynska, whose book *The World of the Wasp* is the bible for amateur cecidiologists. In it, she points out that cynipid wasps are not only small and secretive, they are a bit quirky themselves. Many species alternate generations. They produce two broods a year. The first, known as the unisexual generation, is composed of females only. The second brood (the bisexual generation) is made up of wasps of both sexes.

In some species, the females live their entire lives on one oak tree. Emerging in late summer from the snug comfort of the oak apple galls in which they were born, they attract a male, mate, crawl down the trunk, lay their eggs in the tree's roots and die. When the eggs hatch, a root gall forms. The next spring an all-female generation emerges. They crawl up the tree and deposit their eggs in the terminal buds of oak twigs. When the unfertilized eggs hatch (a process known as parthenogenesis), the larvae secrete chemicals that cause oak apple galls to form. Inside the gall, the larvae feed on the inner tissues of the gall, and derive protection from the tree. Then the cycle begins again.

Before I read Ms. Spoczynska's book, I tried to raise a few wasps on my own. I stored oak apples in a jar with a screw-on top in which I jabbed a few holes to admit fresh air. One day, pin-sized openings appeared in several galls where the wasps had gnawed their way out. Of course, no wasps were in the jar. The holes I punched in the lid must have looked like gaping skylights to the tiny wasps. But I haven't given up; I have more galls in a jar covered with tissue paper.

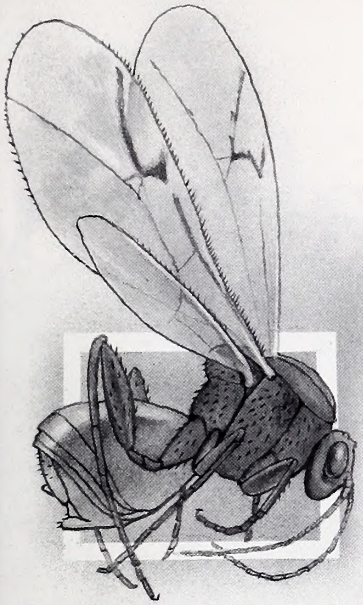
Phillip Manning is a Chapel Hill writer. His latest book, Islands of Hope, *was published by John Blair in 1999.*

Other Reading

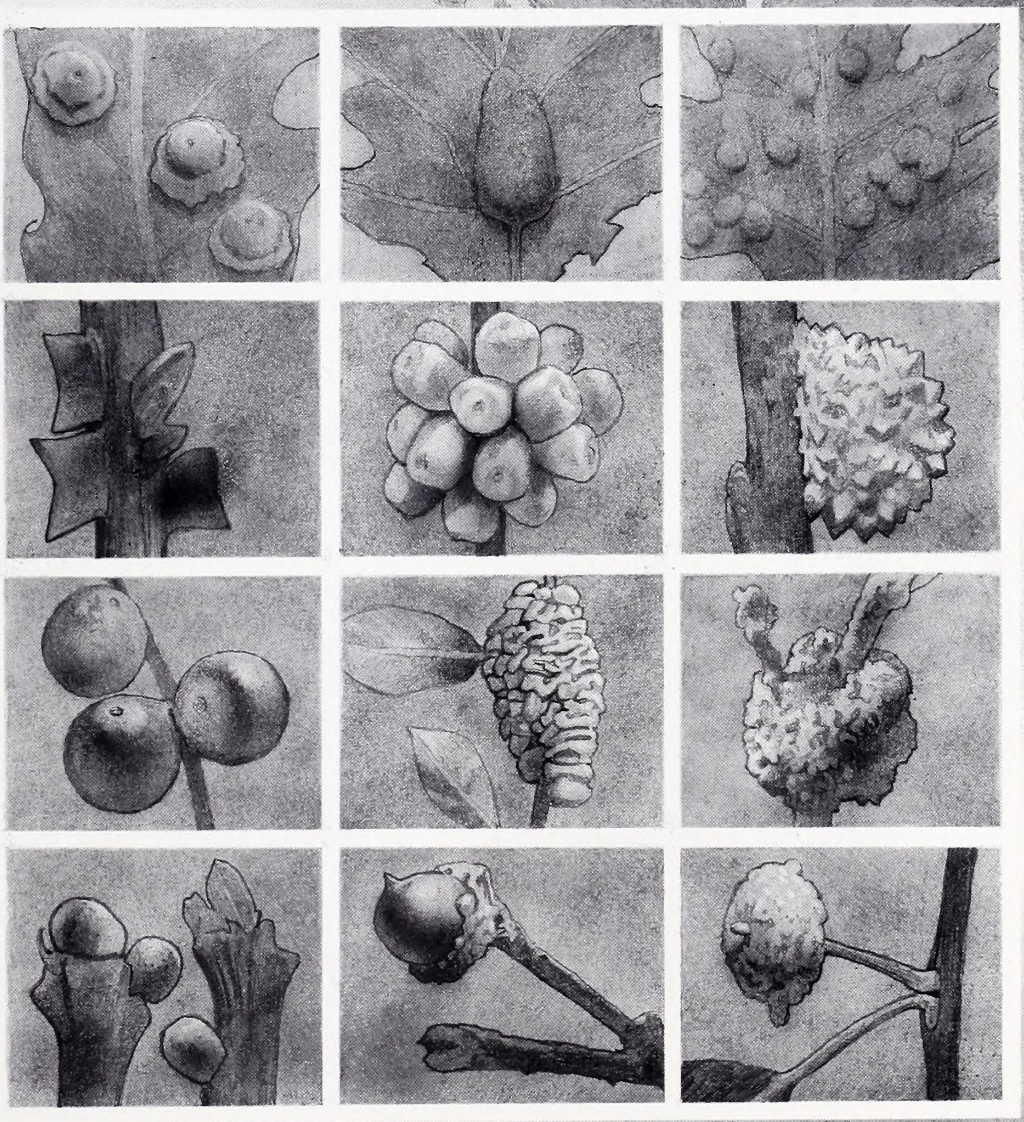
- Joseph D. Shorthouse and Odette Rohfritch, eds., *Biology of Insect-Induced Galls* (Oxford University Press, 1992).
- Joy Spoczynska, *The World of the Wasp* (Crane, Russak & Co., 1975).

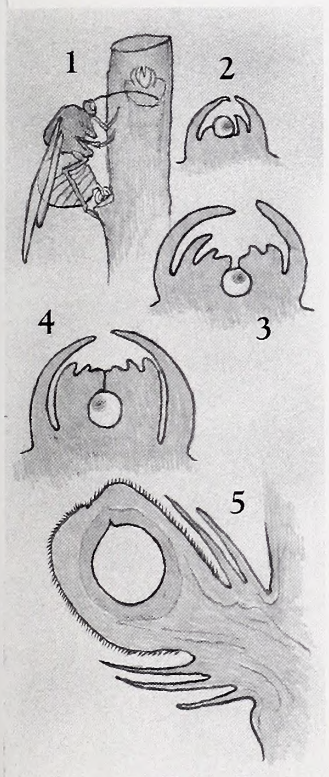
Surfing the Web

- This Web site offers an introduction to plant galls, including some excellent photographs of the many types of galls. *Address:* http://daphne.palomar.edu/wayne/pljuly99.htm
- Visit this site for specific information and illustrations of oak apple galls. *Address:* http://www.jmu.edu/biology/k12/galls/oakapp.htm



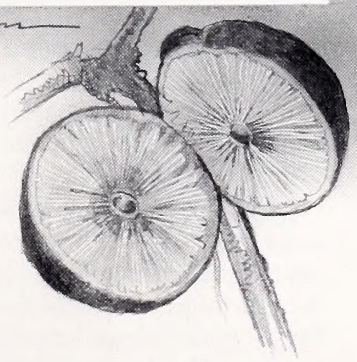
Galls are abnormal growths *that deform a tree or a part of a tree. Twig swellings, deformed buds or leaf blisters are among the many forms they take. Galls are often caused by wasps (left) that lay their eggs inside a bud or leaf, but they can also be caused by bacteria, viruses and fungi.*





Source: Alfred Kinsey, *The Gall Wasp Genus Cynips* (1929).

One type of gall develops *after a wasp lays its egg in the terminal bud of a twig (1). The egg is gradually enclosed by the bud (2, 3, 4) causing the plant's bud to be deformed (5) and take on the characteristic form of a gall.*



Insect galls come in an astonishing variety *of forms, some of which are pictured above. Some oak galls look like apples, others like fruit or acorns, and they can appear on buds, leaves, twigs, roots, flowers, stems and acorns. Galls appear in either spring or fall, depending on the species.*

hot hunting *for* early

A sound like the ripping of wet linen sheets split the sultry air as a pair of tiny duck silhouettes glided against the ghost-gray sky. In an instant, they banked and braked with wings fanning backwards to settle into a horseshoe-shaped spread of two dozen of their fake, plastic kin.

Jim Bushardt laughed softly and whispered out of the corner of his mouth, "I couldn't have raised my gun and fired if I wanted to. They sure are quick little devils, and I would have screwed myself right into the mud. It sure gets the old blood pumping when they materialize like that out of the darkness before legal shooting time. It's exciting because you always hear the sound of their wings before you see them."

I nodded in agreement. Perhaps the blue-winged teal saw the slight movement or overheard Bushardt's whispers. It could be that they just didn't like the company of hollow, plastic teal that did not answer their gentle quacks. Whatever the reason for their departure, the teal didn't stick around for the half-hour-before-dawn legal shooting time that would have made them fair game. Instead, they launched themselves upward against the dark background of a grass-covered dike and were suddenly lost from sight. But we could still hear the wind rushing through their wings as they rocketed away to find a safer place.

Mosquitoes whined and bit. Sweat trickled down our noses from the exertions of paddling our canoes until the water became too

birds

September's experimental teal season offers a bonus plan for Tar Heel waterfowl hunters.

written by Mike Marsh ©2000

MIKE MARSH

***Looking for a chance at some** early-season duck hunting? The Wildlife Commission's experimental September teal season might be the ticket. Just don't forget the bug spray!*

shallow, then walking across the impoundment with the feather-light crafts in tow while mud sucked at our wader-clad feet. I reached into my game bag for a can of insect repellent, sprayed it on my face and hands, then handed the pine-scented aerosol to Bushardt. I pulled a camouflaged net over my clean-shaven face to serve as my only "blind," and Bushardt hid behind his beard. Standing quietly in a clump of needlerushes, we waited.

We were hunting teal on one of the N.C. Wildlife Resources Commission's game land waterfowl impoundments on the opening day of an experimental teal season in September 1998. Inveterate duck hunters, we both shunned the open archery-deer and dove seasons that kept most hunters otherwise occupied. Elated after several years of short seasons forced upon us by the U.S. Fish and Wildlife Service in the early 1990s because duck numbers were low, we were thankfully testing the waters for a bonus hunting opportunity never before offered.

A couple of other parties flashed lights our way, and we signaled in return as hunters spaced themselves more or less uniformly around the

impoundment in rushes and grassy hummocks similar to the clump in which we were standing. Well before dawn, teal began to rocket across the sky in flocks of up to four dozen. As the sky's grayness gave way to pink, a smattering of shots created rumbling echoes across the water. Before the gray of predawn was warmed to red embers by the rising sun, it sounded like a jungle warfare firefight as the hunters began claiming their share of the little web-footed birds that once were excluded from the bags of North Carolina hunters.

The shooting was almost anticlimactic. There were so many teal that a limit of four was quickly taken by everyone in the marsh. In an hour, the absence of gunfire made the morning seem exceptionally still. It was hard enough to minimize ammunition consumption and keep our backsides from pivoting into the mud as we tracked the flight of the speedy little acrobats with shotgun beads. But the most difficult part of the hunt was making absolutely certain that no other species of waterfowl besides green-winged teal and blue-winged teal were harvested.

During the experimental teal hunt, hunters are monitored closely to see how well they can distinguish teal from other species of ducks, as well as to determine their attitudes in favor of the early bonus season, according to Dennis Luszcz, the Wildlife Commission's waterfowl project leader.

"The September teal season is an experimental season," Luszcz said. "The season will take place during a nine-day period over three seasons, with a bag limit of four teal per hunter per day. If, after the experimental hunt has been conducted three years in succession, this state and others in the program stay within mutually agreed upon guidelines for accidental and illegal harvest of species other than teal, then the season may become permanent. Continuation of the season also depends upon hunter response. Hunters in some states are saying September is too hot and too early in the year to be hunting waterfowl, and their early teal season may be discontinued for that reason."

green-winged teal drake

F. EUGENE HESTER

blue-winged teal drake

MASLOWSKI WILDLIFE PRODUCTIONS

This is the third and final year of the experimental teal season in North Carolina, which runs from Sept. 7-16. Other states participating in the September season include Georgia, South Carolina, Maryland, Delaware and Virginia. In North Carolina, the experimental season is open only in the area east of U.S. Highway 17.

"We have had some hunters who did not realize that the season was open only in the eastern region, and they were issued citations by enforcement officers. Keeping the season open only east of U.S. 17 helps to avoid problems with the accidental shooting of other species, particularly wood ducks, which are abundant that time of year. Immature wood ducks that do not have their full plumage can be difficult to distinguish from teal in low-light conditions. By keeping the season on the coast, it is confined to large, open areas where teal are more likely to be found."

Luszcz said that although there are a lot of teal around in September, there are also other species present in the area open for teal hunting. These species include resident black ducks, gadwalls, mallards and hooded mergansers along with some early migrant ducks such as shovelers, pintails and widgeon. Therefore, hunters must be cautious in selecting targets.

Blue-winged teal begin to arrive in the state in August from their breeding grounds in the pothole regions of the Canadian and United States prairies. The U.S. Fish and Wildlife Service has determined that these blue-winged teal are concentrated in North Carolina by September and migrate south by October. Since they migrate prior to traditional hunting seasons that open later in the year, hunters in North Carolina and other mid-South states have no other opportunity to harvest these birds. Federal waterfowl biologists report that the continental blue-winged teal population has responded to improved habitat conditions on the prairies. There are currently more than 6 million blue-winged teal, a number that is 50 percent above the long-term average for the species.

Green-winged teal arrive in the state in September and remain throughout the season. They begin to arrive in coastal Carolina by mid-September, but their numbers don't peak until after mid-October. The continental number of green-winged teal is well above the statistical long-term average, and they are difficult to distinguish from blue-winged teal in flight because of their similar size, giving validation to the two-species season.

Some of the best places hunters can try for a limit of early teal are Wildlife Commission game land waterfowl areas, since these impoundments are managed to attract and hold concentrations of teal. Many of the plants, such as muskgrass, that grow naturally in these impoundments, and agricultural small grains, such as Japanese millet that are cultivated by management personnel, are relished by teal. Within the teal hunt area, all managed impoundments and game lands except the Roanoke River Wetlands and the Little Alligator River game lands will be open during this month's experimental teal season without requiring permits. The Roanoke and Little Alligator areas can be hunted only by permit, and permit hunts will not begin until the regular duck season in October. Hunters should check with local biologists or scout these areas before hunting on opening day. During the early duck season, the Wildlife Commission may not be able to provide adequate water depth in some impoundments, according to Luszcz.

Hunters can also have good luck in marshes near the state impoundments, as well as private impoundments around Lake Mattamuskeet.

In 1998, the first year of the experimental teal season, hunters were unprepared for the early season. However, now that hunters know

about it, Luszcz said, they are planting millet and flooding some private impoundments early enough to take advantage of teal hunting combined with the good dove hunting found in the eastern area of the state.

Luszcz said that hunter turnout was light during the first experimental teal season. However, he expects that to change as waterfowl hunters adjust to the new schedule.

"We had trouble finding hunters to check after the first few days during the first year, although Hyde and Currituck counties had good turnouts," Luszcz said. "Lots of hunters came out early in the season. However, after the first couple of days, hunters got bored or went on to other pursuits, although the teal were still around."

On opening day of the 1999 season, it seemed that Luszcz's prediction of increased hunting activity had come true. Hunting with me along a tidal river in addition to Bushardt was West Paylor. Before dawn, the marsh around our decoys was abuzz with the outboard motors of other hunters. Daylight brought a repeat of the 1998 opening day, with many hunters taking limits of teal before the sun showed above the cordgrass.

Paylor was overly cautious not to shoot the numerous shovelers that swarmed into the decoys. However, Bushardt had more experience identifying September's dull-plumaged blue-winged teal and took a pair after Paylor let them land and jump from the decoys without firing his gun.

"I wasn't positive they were not spoonies," laughed Paylor as he congratulated Bushardt for his good shooting.

We gave him some gentle ribbing over the misidentified ducks while Santana, my Labrador retriever, collected the teal. However, we all knew that it was important that only legal teal were taken.

To add an exclamation point to the exercise of extreme caution during the early season, Master Wildlife Officer Bill Lester materialized from the marsh to check our bag.

"I saw some other species in the area earlier in the week and wanted to make certain that hunters were taking only teal," Lester said.

On that particular morning, Lester said that all the other hunters he had checked were in compliance with the teal-only bag limit. Hunters must take heed that there is approximately a 10 percent maximum allowable take of accidental or illegal harvest of species other than teal. If this target level is reached, the U.S. Fish and Wildlife Service probably will not allow the experimental season to continue. Luszcz stressed that it takes only a few incidents of poaching nontargeted ducks to cause the 10 percent allowance to be exceeded, because the number of hunters and observers is relatively small compared to "regular" duck seasons.

"If hunters will only learn to identify their ducks, we can have longer seasons, as well as more special seasons of this type," said Luszcz. "Waterfowl hunting seasons are shortened to protect those species which are in lowest abundance. If hunters will learn to harvest those species that have the greatest abundance, then extended seasons and bag limits for species like teal will continue to be offered when there is biological justification." ⊠

***With half of his four-bird limit** collected, Jim Bushardt waits with the author's retriever, Santana, for the next wave of blue-winged teal to arrive. At times, the speedy little ducks can blanket the early-morning skies.*

MIKE MARSH

Bubba's Autumn Outdoor *Etiquette* Guide

Bubba Manners has all the answers for those ticklish questions of outdoor behavior.

written by T. Edward Nickens ©2000
illustrated by Jackie Pittman ©2000

Time to hit the trail, hit the cape, hit the woods. You and 10 million other people. Oddly, getting along with others is a skill increasingly required of those attempting to get away. More folks looking for the wild in all the lost places means common courtesy is as critical to a quality outdoor experience as knowing how to orient a topo map, or turn on a GPS unit. Happily, our outdoor etiquette guru, Bubba Manners, is here to help. Sort of.

Dear Bubba Manners:

I don't know how I slept through the alarm clock, but the other morning I barely had enough time to drive to the lake, motor to a likely looking spot and throw the decoys out before sunrise. Another group of duck hunters were already on my favorite point, so I just went down the lakeshore a hundred yards. If nothing else, I figured, I could call at birds flying by the point, maybe even get a shot at some passing over. In fact, I did just that. Seven mallards swung around those other decoys and I opened up. You wouldn't have believed how far that duck was when I knocked him down! Sixty yards, easy! But he swam over toward those other fellows, and they retrieved him. Never even asked if I wanted my own bird. Should I have given them a piece of my mind?

Signed,
Ducking the Issue

Dear Ducking:

This is one issue that strikes very close to home. Having duck hunted public lands for nearly two decades, I am convinced that the most inconsiderate, self-centered and unsportsmanlike outdoors people—as well as some of the sporting world's greatest folks—are duck hunters. And few acts are as egregious as arriving late on public duck hunting grounds. Yes, I know you missed your alarm. Yes, I know how hard it is to find a gas station open at 5 a.m. But a lack of planning on your part doesn't give you the right to ruin the best gunning of the day for all the other folks who set a backup alarm, made a late-night visit to gas up the truck, and gave up an extra hour of sleep to make it to the water on time.

At its best, public lands duck hunting—or hunting of any kind on public land—is a roll of the dice. Can you get to your spot before someone else does? Will someone set up too close to your position? Will some ill-informed nimrod

quack at every dot in the sky? As more and more people flock to public lands, a greater respect for one another is called for, but is in increasingly short supply. Here are a few guidelines:

Get there early. The unfortunate outcome of this is a 2 a.m. start, not altogether uncommon. But better that than some dunderhead blundering into the beaver pond at a minute past shooting light.

Respect the other guy. I get antsy whenever anyone sets up within 300 yards of me on open water. That's not too much to ask.

Know your limits. The fact that you once knocked a bird down at 70 yards doesn't negate your sins of missing or crippling countless others.

Let working birds work. When ducks are heading toward someone else's decoys, stow the call and keep your gun in your lap.

Dear Bubba Manners:

I was backpacking in the Nantahala National Forest when I came across a hunter and his dog working down the ridgeline. I'd guess they were looking for some kind of bird, but I don't know the first thing about hunting and wasn't sure how to react. Should I have whistled? Stepped off the trail? I was interested in what the fellow was after and what he'd seen, but didn't know if I should strike up a conversation or not. Any pointers?

Signed,
Sharing the Road

Dear Sharing:

First, let me commend you for your reasonable response to this situation. As more and more user groups share our common resources, it becomes increasingly difficult to know just how to handle backcountry tete-a-tetes between mountain bikers and birdwatchers, hunters and backpackers, wildlife photographers and wildflower buffs. And bumping into someone with a gun can be a bit, well, off-putting. Hunters everywhere appreciate your perspective.

So, a few guidelines for good manners when you bump into a modern-day Leatherstocking. If you see one or two hunters ambling through the woods with a dog, most likely they are hunting some kind of bird—grouse, woodcock, quail or some other upland game. Bird hunters are often concentrating intently on hearing the dog's beeper collar or bell—which alerts them to a "point" and the prospect of getting a shot—and they may not hear your approach. Give them a hearty "hello," and consider even engaging them in a short conversation. Bird hunters aren't too concerned about you scaring game out of the area, and will often be happy to trade notes. Maybe they know of an off-trail spring or camping site that's missed your attention. Most of them will appreciate the chance to prove that hunters are an amiable sort.

It's a different story with folks in pursuit of deer or turkey. It's likely that the most common interaction with big-game hunters happens when an unsuspecting hiker suddenly looks up into the eyes of a fully camouflaged hunter perched like a panther up a tree. They have often spent hours stone-still and silent, but, of course, it's not your fault for wandering into their hunting area. Your best move is to try to slip out of the general vicinity. Chances are a hunter in a tree stand has seen you long before you see him. If not, whistle to get the hunter's attention, wave, point in the direction in which you're going to pass, and walk well around the area. It's only common courtesy.

Dear Bubba Manners,

Is there anything more intimidating than a beginner's attempts to fish from a crowded pier? Yikes! Do I elbow my way into the crowd along the rail? Can I leave my rod while checking out the action elsewhere? Do you think folks would mind if I tried a freshwater buzzbait? I'd just bet one of those speckled Spanish spotted sheeptarpon would love to chomp down on a topwater plug.

Signed,
Expanding My Horizons

Dear Expanding:

Reading your letter, I am reminded of the popular saying, "When in the land of the sunburned, cigarette-butt-chomping, bleary-eyed-'cause-they've-been-at-it-since-yesterday pier fisherfolk, do as the sunburned, cigarette-butt-chomping, bleary-eyed-'cause-they've-been-at-it-since-yesterday pier fisherfolk do." I

think that's from Shakespeare.

Anyway, my point is, all you need to know about pier-fishing etiquette you can pick up by watching the old salts. See how they always look behind them before they cast? That way you avoid the inadvertent use of some poor tourist's earlobe as bait. Also, the best of them cast underhanded. That way you never lose your spot at the rail. Most NASCAR champions can't block out the competition like a dedicated pierhound.

A crowded pier does, indeed, look like a long, linear fistfight is about to break out at any moment, but the best fishing spots—under the curling waves for pompano, flounder and spots; the outside edges of sandbars for blues and Spanish mackerel—are fairly constricted places, and most experienced pier fishermen are accustomed to slinging bait shoulder to shoulder. Just remember to cast straight out, and you'll be in good company.

Other ways to keep peace along the pier have to do with common courtesy. Toss extinguished cigarette butts into the trash can, not onto the pier where bare feet abound. Also, treat your few feet of pier and rail with kindness. Kick unwanted fish and pieces of cut bait into the water. Clean up your tangled line and bent hooks. No one will confuse an ocean pier for a pristine wilderness environment, but a little minimum-impact ethic will go a long way toward keeping piers among the most pleasant places to while away a day.

Dear Bubba Manners,

What a bunch of spoilsports! Just this past weekend I went on my first big wilderness adventure, a four-day ecotourism trip with Big Bill's Big Adventures, Esq., Ltd., Inc. Hey, I'm no mountain man, but I'm no tenderfoot, either. I can carve a fuzz stick. Or could, 30 years ago. Anyway, there we were, gathered about the roaring campfire, when I started in with my knock-knock jokes. Lemmetellya, nobody tells knock-knock jokes like I can.

Well, I was feeling good, with a killer cigar and the occasional snort of Ol' Masher, when suddenly the whole crowd hit the sack. The first owl hadn't even hooted! All of a sudden, I was feeling like a bad haircut at a debutante ball. What do you think, B.M.?

Signed,
Good Old Boy with Hurt Feelings

Dear G.O.B.:

Hmm. It seems that the call of the wild is being heard by more and more folks with little experience in the delicate art of getting along in the backcountry. Now, that can be a good thing. Wild places need people to stand up for them. But we all have to be aware that the woods can't function as a neighborhood bar. Especially on guided ecotourism trips, which are growing in popularity, good people skills are as important as knowing how to pitch a tent. Methinks I can help.

Experiencing the natural world in a guided group requires a bit of give and give. You give up your right to do exactly what you wish exactly when you wish. But all that's OK. You also give up the responsibility for finding campsites and making sure there's fuel in the campstove! Not a bad deal.

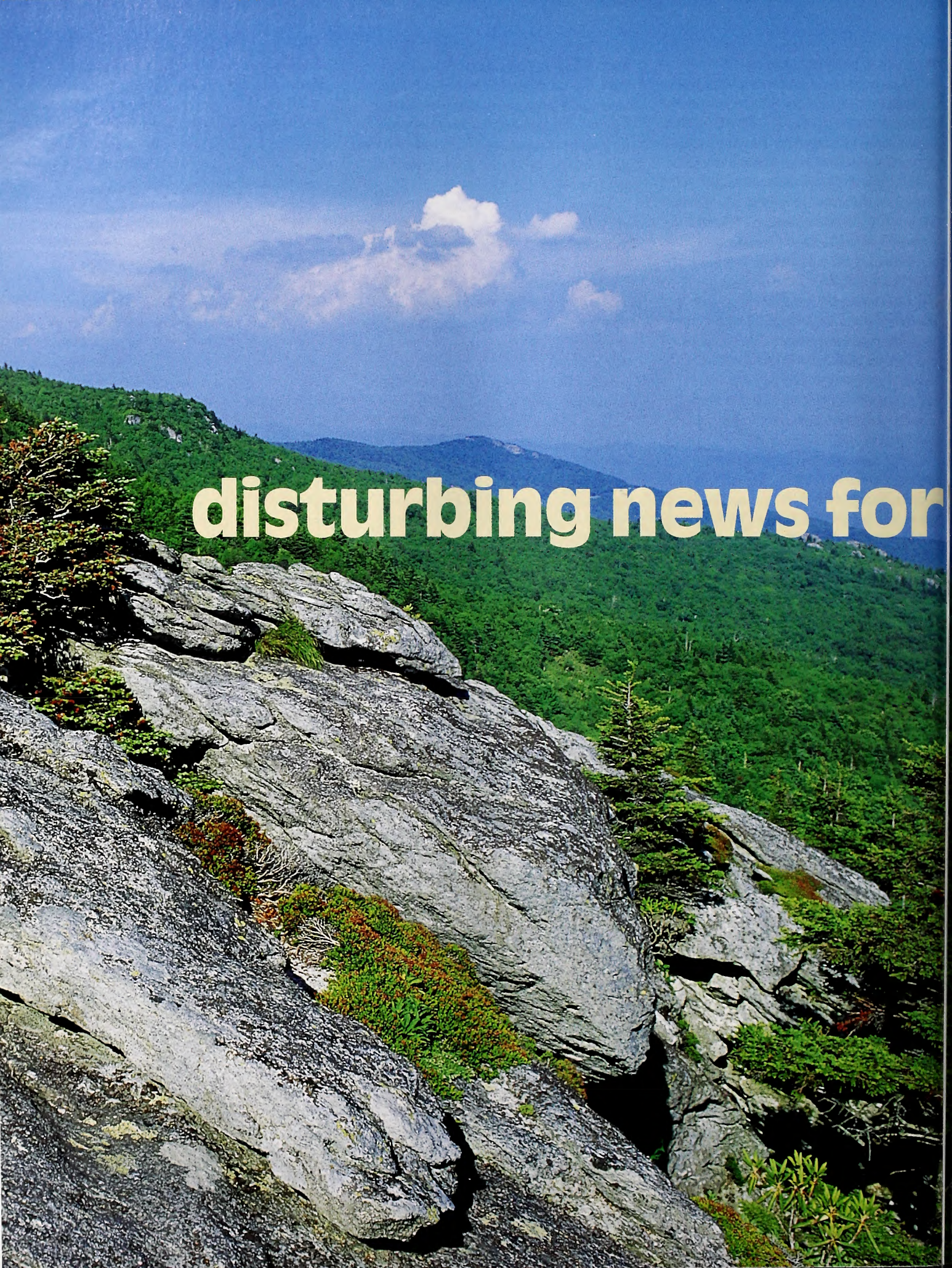
However, you'll be experiencing the wild with a number of strangers around. The same rules apply to you that apply, say, to my 3-year-old daughter when she goes to daycare.

Namely, smoke cigars downwind from everyone else. Lay off the evening toddies; you're less funny and more dangerous than you think you are when you've been drinking. 'Fess up if you snore so sleeping arrangements can be made that will keep your disruptions to a minimum. After all, you can't hide it for more than one night, anyway. Keep your flashlight beam out of other people's eyes. Don't spit.

When you sign up for a guided trip, be honest about your abilities and limitations. Don't pack a 10-pound video camera and tripod and expect everyone else to carry more weight to offset your load.

And a word about those unusual and largely bearded creatures, the backcountry guides. Bear in mind that your guide is not your servant. Modern adventure outfitters do not operate like 19th-century African safaris. So you should pitch in. Stir the pot. Tighten the guy lines. Haul water. Haul trash. If your guides are washing dishes all the time, there will be less time for you to learn from their experience. Would you rather have your money go toward pot-scrubbing or instruction on refining your paddle strokes, or making a fire by friction, or plant identification?

And give the poor guide a break. Go to bed. He or she feels, with good reason, that they should be the last one to bed and the first one up. If you're still spinning college yarns and poking the fire at 2 a.m., don't expect your sleep-deprived guide to have the coffee on at sunrise. ⊠


disturbing news for

mountain forests: a wildlife DILEMMA part I

wildlife

As North Carolina's mountain forests age, many wildlife species have been left hanging on the ropes.

written by Lawrence S. Earley

MOST CONSERVATIONISTS ARE EASILY CONCERNED ABOUT THE UNCERTAIN FUTURE OF NORTH CAROLINA'S OLD-GROWTH MOUNTAIN FORESTS, ESPECIALLY AFTER A WALK THROUGH THE ANCIENT GROVES OF JOYCE KILMER MEMORIAL FOREST. BUT FEW ARE AS CONCERNED OVER THE FATE OF EARLY-SUCCESSIONAL HABITATS. GRASSY MEADOWS, SHRUBBY THICKETS AND OTHER DISTURBED HABITATS ARE AS VITAL AS OLD-GROWTH FORESTS TO THE PLANTS AND WILDLIFE THAT ARE ADAPTED TO THEM, BUT OPEN MOUNTAIN HABITATS ARE VANISHING VIRTUALLY WITHOUT MENTION.

IN THIS TWO-PART SERIES, ***WILDLIFE IN NORTH CAROLINA*** EXPLORES THE VALUE OF EARLY-SUCCESSIONAL HABITATS FOR MOUNTAIN WILDLIFE, THE REASONS FOR THEIR GROWING RARITY, AND WHAT IS BEING DONE TO MAINTAIN THEM.

MASLOWSKI WILDLIFE PRODUCTIONS

Glorious vistas of mountain forests sometimes disguise a growing imbalance in forest ages. Cut shortly after the turn of the century by cut-and-run loggers, many trees are approaching middle age. Wildlife biologists are concerned that a scarcity of early successional habitats in national forests will have detrimental effects on many wildlife species such as the prairie warbler (above).

"Prairie Warbler!"

Dean Simon points to a yellow blur that rockets in front of us and disappears into a shrub. "That's a bird that's tied to these habitats," he says. The truck sways gently as we negotiate the pitted logging road that crosses the young clearcut in Rutherford County. Where the forest thickens once again, we turn around and drive back to the center of the 25-acre opening. After a few minutes, we hear the distinctive call of an indigo bunting.

The white pine plantation was cut two years ago by the former owner, part of a 2,400-acre parcel that was set aside for timber harvest before the N.C. Wildlife Resources Commission bought the 18,000-acre tract in 1998 to make the South Mountains Game Land. Two and a half years after it was cut, it's a patchy thicket of thinning grasses, briery shrubs and young saplings.

"You're looking at an early successional stage of the forest," says Simon, the Wildlife Commission's mountain region forester. "Last year this was in its second growing season and there was a lot of broomsedge here. Now there's not much. The next stage is the woody species—black locust is an early invader; it will play out and other species will grow. Sweet gum is coming in. These are the species that will grow quickly in this area. And blackberries—look, you can see the white flowers. Pokeberry is here, and honeysuckle."

Given enough time—say about 200 years—you could stand here and watch the forest grow, starting from this cutover. The grasses come first, followed by shrubs, and then, depending on the site, by quick-growing tree species such as pines, yellow poplar, black locust, red maples and sweet gum. Unless this process is halted by fire, disease, another harvest cutting or some other disturbance, the slower-growing oaks and hickories would eventually mature, push through the canopy and dominate.

mountain forests: a wildlife DILEMMA part I

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—Dean Simon, N.C. Wildlife Resources Commission mountain region forester

LAWRENCE S. EARLEY

As a wildlife forester, Simon is particularly interested in forest succession because each stage hosts a very different suite of wildlife species (See "Sun Lovers," page 17). The early-successional stage in front of us may look like a weedy tangle, but it's ideal habitat for bobwhite quail, indigo buntings, prairie warblers, eastern towhees, yellow-breasted chats, yellowthroats and cottontail rabbits. They can feed here, and the young trees, shrubs and brambles provide shelter from predators and cover for their nests. But as the habitat ages and a dense forest of pines grows up, these animals will have to find another patch of early succession.

In the mountains of North Carolina, however, that's becoming harder to do and the result, according to wildlife biologists, is a noticeable decline in the populations of many wildlife species tied to early successional habitats. On private lands, forestland generally is not regenerating as forests are converted to second home developments, retirement communities and new roads. On public lands such as the vast Nantahala and Pisgah national forests, forests are aging as timber harvests are reduced.

Yet in the mountains today, it is not easy to plead for the creation of more early successional forests, even if there are solid biological grounds for doing so, especially if that means more cutting. It can easily be construed as merely a Trojan horse disguising an argument for clearcutting. The U.S. Forest Service has been forced by public pressure to reduce cutting on the million-acre Nantahala and Pisgah national forests. As recently as 1990, 3,000 acres were clearcut on these forests; in 1999, only 49 acres were clearcut. President Clinton's controversial "Roadless Initiative," proposed in October 1999 and debated in public hearings last summer, would prohibit road building and possibly even logging on 43 million acres of roadless areas under federal ownership.

At a time when the public increasingly believes there's far too much timber harvesting on our public lands, are wildlife biologists suggesting that there's not enough?

"The message we want to bring is not that everything needs to be in early succession," Simon says. "The idea is diversity. Early forest stages are as vital as old growth, and are becoming just as scarce. Even though it's ugly and brushy, early succession has its place in the ecosystem."

"Disturbing" News

The age structure of the national forests is nothing like that of the original forest predating European settlement. These mountain forests were full of openings caused by random disturbances such as fires, hurricanes, insect infestations, ice storms and even beavers. Each of these events created gaps here and there in the canopy where forest regeneration could occur and succession could begin all over again. In its natural condition, a forest was not a solid wall of old trees, but consisted of many different age groups—brushy openings, early stages of forest growth, middle-aged stands and ancient trees.

And when the first Americans came into the Southeast about 12,000 years ago, they became a disturbing force themselves, setting fires in the forest to aid their hunting and to create and maintain openings for their crops. No wonder the first Europeans who traveled through the region found a very different kind of landscape than we imagine.

"The early explorers that came into this country found vast open spaces they referred to as 'open plains,' 'savannas' and 'prairies,'" says Lawrence S. Barden, a biology professor at the University of North Carolina at Charlotte who has studied early reports about Piedmont landscapes. He points out that in 1670 explorer John Lederer reported seeing savannas 25 miles wide in the Salisbury area, caused by Indian fires. "The country here, by the industry of Indians, is very open, and clear of wood," Lederer wrote. In the mountains, where thick forests today are considered one of North Carolina's glories, 18th-century explorer William Bartram found a varied landscape in the land of the

"Some people would argue, all this fescue, this is early succession. But it doesn't stay in that stage year round. As soon as the meadowlark builds its nest in the hayfield, it gets mowed down."

—David Sawyer, N.C. Wildlife Resources Commission district biologist

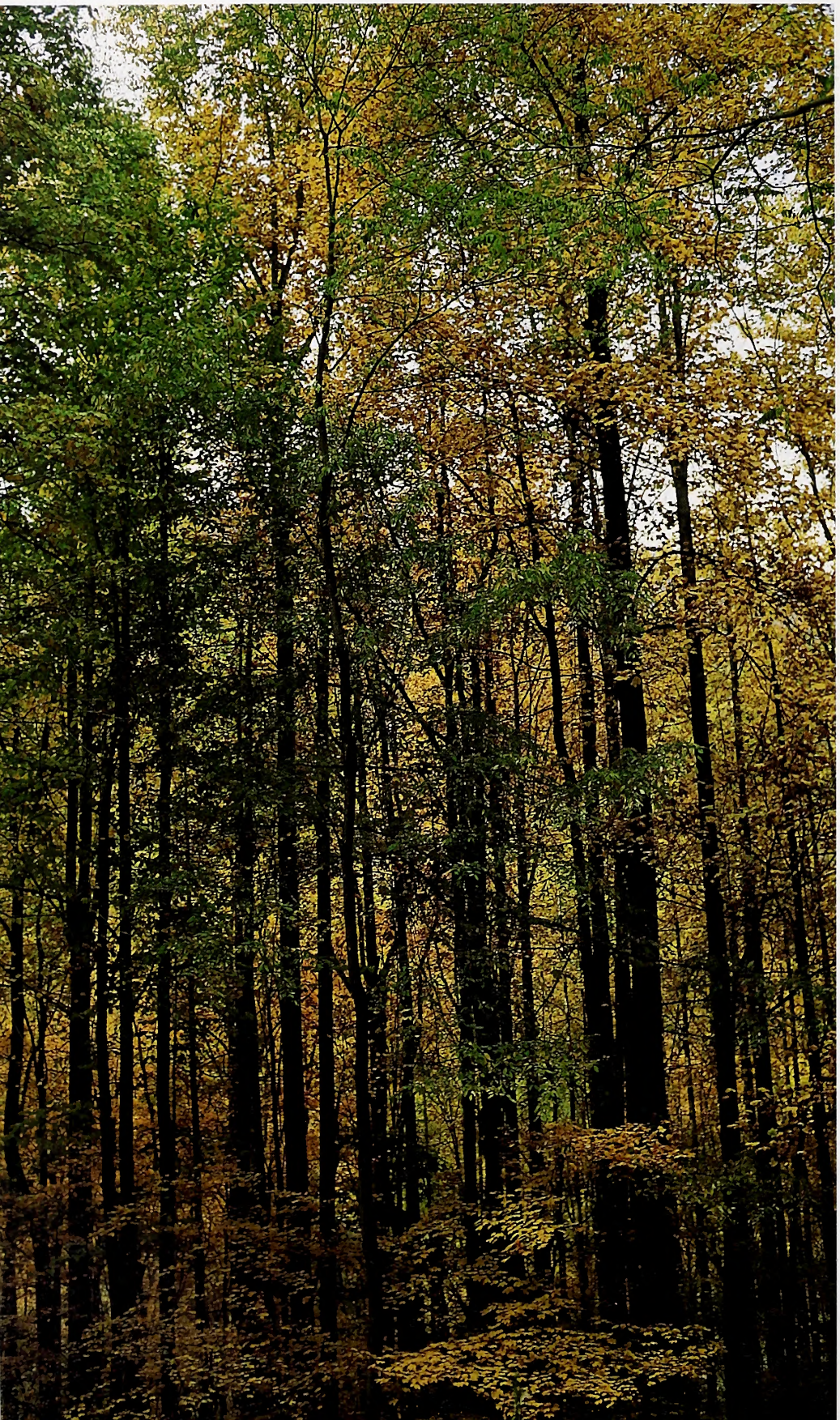
KEN TAYLOR

MELISSA McGAW

A weedy, unmowed meadow (above) provides good early-successional habitat for deer, quail, rabbits, prairie warblers, meadowlarks and other wildlife species. But closely grazed or mowed grassland like this pasture (left) affords little or no cover for these creatures. Regular mowing can destroy bird nests and even young birds.

mountain forests: a wildlife DILEMMA part I

KEN TAYLOR



Cherokee "consisting of forests, meadows, groves, expansive savannas, fields and swelling hills." He continually writes of seeing "grassy vales" or "grassy open forests."

Studies in the old-growth forests of Joyce Kilmer Memorial Forest and the Great Smoky Mountains National Park confirm that openings are natural parts of an ancient forest, with 17 to 24 percent of the forest canopy interrupted by gaps.

Other indications of how extensive these openings were are found in the sheer numbers of small mammals and birds that

WILLIAM S. LEA

have adapted to them, says David Sawyer, the Wildlife Commission's district biologist for northwestern North Carolina. "The open stages represent only about seven to 10 years out of a forest life that stretches over perhaps 300 years," he says, "yet so many animals are tied to this habitat type."

Bobwhite quail, woodcock and ruffed grouse are among the familiar game species on this list, but a surprisingly large number of nongame birds find themselves there as well. "Most articles that are being written emphasize the problems that birds adapted to forest interiors are having—cerulean warblers, for

This dense mid-successional forest (left) contains many canopy-level trees, but for the next several decades the closed canopy will reduce the light that reaches the forest floor. The lack of grasses, plants and shrubs makes this forest less suitable for early-successional wildlife species. An old-growth forest with its multiple layers of vegetation is superb habitat for deer and many other wildlife species. Canopy-level trees (such as oaks and poplars) join mid-canopy trees (such as dogwoods), shrubs and ground cover to offer a multitude of habitats for wildlife.

WILDLIFE Bobwhite quail • Woodcock • Ruffed grouse • Bobolink • Meadowlark • Vesper sparrow • Bog turtle (T) • Eastern cottontail • Prairie warbler • Common yellowthroat • Golden-winged warbler • Bewick's wren • Yellow-bellied sapsucker • Regal fritillary butterfly

PLANTS Spreading avens (E) • Roan Mountain bluet (E) • Mountain sweet pitcher plant (E) • Green pitcher plant (E) • Cranberry • Bunched arrowhead (E) • Heller's blazing star (T) • Blue Ridge goldenrod (T) • Swamp pink (T) • Mountain golden heather (T)

After a tornado or ice storm creates a gap in a mountain forest, grasses and shrubs flourish briefly in the light-filled opening before they are shaded out by quick-growing pines and hardwoods. Though this early successional stage is short, it is critical for many wildlife and plant species. The species at left are tied to such open habitats in the mountains. Some of them are listed as endangered (E) or threatened (T).

example, or Swainson's warbler," says Mark Johns, the Wildlife Commission's Partners in Flight coordinator. "But if you look at the data, there are fewer of those having problems than birds such as bobolinks, meadowlarks, orchard orioles, prairie warblers, common yellowthroats, loggerhead shrikes and several others. These are birds that you would call grassland or early-successional birds, and they are all showing declining trends."

Many plant species are also adapted to open mountain habitats, and some are today quite rare, found in out-of-the-way places such as roadsides, power lines and bogs. Nora Murdock, wildlife specialist with the Asheville office of the U.S. Fish and Wildlife Service, has identified at least 13 federally listed plant species and 18 candidates for listing that are adapted to open mountain habitats. Populations of several grasshoppers and butterflies dependent on disturbed areas are also declining, she notes. Many of these species are adapted to fire, and several plants, she adds, are also Southern Appalachian endemics—they grow there and nowhere else.

"What that says to me is that they evolved here," she says. "And because they required openings, it doesn't make any sense that they evolved in the widely scattered openings that are now left. There had to have been more of these openings spread more broadly across the landscape."

Some argue that there are still plenty of these habitats left, especially on private lands. In a letter to the President last fall, more than 50 prominent scientists, including Lynn Maguire of Duke University, argued that such habitats were "found widely throughout the region and that many species that use them are common in back yards." North Carolina, for example, contains 16.75 million acres of private forestland and only 1.95 million acres of federal and other public lands. "If you think there is a problem with a lack of early successional habitat, maybe the place to try to solve it is by advising managers on private lands of ways that they can make their habitats more hospitable to some of these early successional species," Maguire suggests.

Wildlife biologists agree, but they say it may not be that simple.

One day last May, David Sawyer showed me what was happening to privately owned lands in his northwestern district. As we drove the back roads, he pointed to the new subdivisions with broad expanses of mowed lawn reaching all the way to the road, and picturesque farms with "wall-to-wall" fields close to the highway. We passed rolling pastureland dotted with dozens of bales of freshly mown hay.

In the past, weedy fence rows and old fields provided excellent early-succession habitat for nesting and brood-rearing animals. But farming practices have changed drastically since World War II, and the acreage of farmland left idle each year has dropped with them. Leaving fields fallow is unnecessary; farmers can grow crops continually on the same field by using fertilizers. The wide-scale use of herbicides and bush-hog mowers destroys hundreds of thousands of additional acres of early-successional vegetation.

To Sawyer, this clean and tidy landscape has become much less friendly to wildlife. Fescue, the forage grass that I saw baled in the pastures, provides almost no food or cover for wildlife. It forms a thick sod and an unbroken mat of vegetation that's as unfriendly to quail as concrete.

"Quail need to be able to walk out under and through clumps of grass and pick seeds and insects from beneath this canopy," Sawyer said. "They avoid habitats that don't provide extensive low cover to screen them from predators. Other species like turkeys use the cover for nesting and also to protect

mountain forests: a wildlife DILEMMA part I

themselves from predators. They eat insects in the summer, and in the fall and winter they like open woods where they can find acorns.

Some species excel in this close-cropped landscape. Skunks and groundhogs have expanded their range, Sawyer said, and bluebirds like it because in the low cover they can catch insects. But for species dependent on tall native grasses and brushy habitats—meadowlarks, field sparrows, quail—this is alien and even hostile terrain.

"If a meadowlark nested in that hayfield last week, it's gone now," Sawyer said. "Some people would argue, all this fescue, this is early succession. But it doesn't stay in that stage year round. As soon as the meadowlark builds its nest in the hayfield, it gets mowed down."

As a district biologist, Sawyer offers technical guidance to landowners to increase the wildlife on their properties, but dealing with landowners one at a time, he said, is frustrating when the entire landscape is being transformed by forces he has no control over.

"A landowner will come to me and ask for some guidance, but I know it's a pinprick on the landscape. If this fellow cuts his trees, we might have some habitat here, but the next opening may be 20 miles down the road. Birds may be able to fly there, but other species—small mammals, reptiles, amphibians, quail—might as well be on a small island in the middle of the ocean."

The land-use trends that Sawyer observes in Iredell County are similar in the mountains. The decreasing numbers of woodlands are scattered islands of habitat in a sea of cleared land, and when these woodlots are cut today they are not allowed to regenerate. They are converted to lawns, asphalt or Christmas tree farms. According to the Southern Appalachian Forest Coalition, developed land in the 4.5 million-acre Southern Appalachian region increased by more than 35 percent between 1982 and 1992 while private forests lost 200,000 acres from 1982 to 1993. Additionally, there are indications that private forests in the mountains are expected to age in the coming decades. Last April the Southern Center for Sustainable Forests produced a draft report on the effects of chip mills in North Carolina. According to one scenario, early-successional oaks, hickories and other upland hardwood trees on private lands in the mountains would decrease from 156,649 acres in 1990 to 71,529 acres in 2020. Over the same period, meanwhile, trees in the sawtimber-size class—the largest size class of trees—would increase by more than 150,000 acres.

Looking at these figures, Derb Carter, of the Southern Environmental Law Center in Chapel Hill, suggests that concern over the amount of cutting in the mountains is misplaced. "The real cutting in North Carolina is going on in the Coastal Plain, and it's largely being ignored," he says.

With private forest lands in the mountains being transformed by suburbanization, can public forests offer a better alternative for wildlife? Indeed, Pisgah and Nantahala national forests offer a huge canvas for wildlife management, but they have their own problems.

Forests of a Certain Age

When the turkey slowly crossed the grassed road ahead of us, Dean Simon got out of the truck and walked gingerly up the path, sweeping his gaze from side to side. Turkeys and their poults often come to these roads, Simon said, because they are one of the few habitat types providing sunny openings where the young can feed on seeds and insects. Sometimes the poults can be found hiding in the middle of the path.

Which is almost exactly what Simon found. Two little turkeys, several weeks old, were trying their best to conceal their brown, splotchy bodies beneath a fallen limb beside the road. From the woods I could hear the hen's "scut, scut," warning her brood to stay put. Dean and supervising wildlife biologist Gordon Warburton each picked up a poult and placed it safely off the road. Several other poults we had not seen suddenly darted into the woods.

We had been visiting a variety of publicly owned forest sites in the mountains that morning. A section of Pisgah National Forest, owned by the U.S. Forest Service, was on our list, as was our present site, Thurmond Chatham Game Land, owned and managed by the Wildlife Commission. What we especially noticed in both forests was the sheer numbers of even-aged, second-growth forest, the result of heavy logging early in the century and six or eight decades of regrowth.

"You see this referred to as the mid-successional stage," explained Warburton. "The

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tree canopy overhead captures the sunlight and the forest floor is covered with a mulch of decomposing leaves. As a result, there's hardly any understory here, no vertical structure." Indeed, as we stepped into the cool and dark forest interior, I noticed no grasses growing, no berries or other low-growing foods that wildlife might eat, no wildflowers that would provide nectar for butterflies. Yet it's hardly a wildlife desert.

"It's important to point that there are species that absolutely need this mid-successional forest," said Simon. Among them are ovenbirds and black and white warblers, which prefer an open understory for their ground nests. Hawks and owls like to build their nests in tall trees and be able to see the open forest floor below. Salamanders and small mammals such as shrews and chipmunks can burrow in the thick, shaded duff. Gray squirrels, and in some places red squirrels, make their nests in the trees.

"It's very important to have this kind of forest represented in the landscape, just as much as early-succession or old-growth," says Simon. "If we can achieve a balance of forest ages across the landscape, we can maximize wildlife diversity."

What concerns wildlife biologists is the sheer amount of national forest land in mid-succession—as much as 80 percent, according to the Forest Service. "It all goes back to diversity—a diversity of habitats brings a diversity of birds and other wildlife," says Warburton. "But a forest of 70- to 90-year-old trees won't do that."

Given enough time, of course—perhaps another century or more—fires, storms, insects and disease will begin to whittle gaps in these closed forest canopies, allowing sunlight to flood the forest floor and stimulate the growth of new vegetation. Springing up in these sunlit spaces, wildflowers, fruit-bearing shrubs, seed-bearing grasses and young saplings will provide cover and food for a host of early-successional species.

But for some species, 100 years might be just too long to wait.

Golden Days

The hiker stopped with her heavy pack and looked at us curiously. She had just emerged from the woods below, following the Appalachian Trail toward Little Hump, a mountain bald that is part of the Roan Mountain chain. The bald was covered with Timothy grass and scattered hawthorn shrubs. The trail skirted the thicketed bald and passed by a low woods into which we peered with our binoculars.

"What are you looking for?" she asked.

"Rare bird," Warburton whispered. The hiker shrugged and went on. She was on her way to Maine; she didn't have the time to wait for a golden-winged warbler to show itself.

We glassed the interior of the woods intently, following the warbler's singular song as it flitted from tree to tree but never quite catching sight of it. Finally, Gordon saw it and then Dean—his first-ever sighting of the bird. I was the last to see the small, grayish bird with a yellow crown and yellow wing patch. It darted out into the open patch of bald, found a conspicuous perch in a shrub, tilted its golden head back and sang its morning song.

"See, this is really a thicket," Gordon said, sweeping his arm to indicate the mix of grass, shrubs and young forest in which we were standing. "This is exactly what the golden-wing needs."

And not just the golden-wing. The forests and thickets where we are standing ring with the spring songs of dozens of birds, but the golden-wing has nearly become an early-succession "poster bird," at least partly because of a study by David Buehler of the University of Tennessee-Knoxville that linked the bird's decline on the Cherokee National Forest in Tennessee to restrictions on timber cutting. The warbler is restricted to very young successional stages, 4 to 10 years old, and above 3,000 feet in elevation. Even a small clearcut of 1 to 2 acres can provide habitat for a single nesting pair, while 10- to 15-acre clear-cuts can support two or three nesting pairs.

Restrictions on timber harvests are not limited to the Cherokee National Forest. As the Nantahala and Pisgah national forests prepare their own forest plan revisions, public pressure is mounting to eliminate timber harvests entirely. Wildlife biologists feel that they may be fighting a losing battle to keep species like the golden-winged warbler that depend on disturbed habitats. The key to these species' survival, they say, is to maintain the options for forest and wildlife management. That may not be easy. ⊠

JOHN TROTT

Forest managers can create early successional habitat in a variety of ways. One way is through this two-aged shelterwood (left), in which some trees were removed but others left behind. Such open forests stimulate the growth of grass and shrubby vegetation that, at altitudes above 3,000 feet, may provide critical habitat for the golden-winged warbler (above).

■ ■ ■

Next Month: The Case for Management

Wildlife Commission biologists are urging management techniques that will open up some of the middle-aged forests.

NORTH CAROLINA
Hunting Seasons 2000–2001

Species	Hunting Season	Daily Limit	Possession	Season
CROW	Thurs., Fri., Sat. of each week from June 1 to Feb. 28 plus Labor Day and Christmas Day (Seasons shown are valid through June 30, 2001.)	No restriction		
DOVE	Sept. 2 – Oct. 7 (12 noon through sunset from Sept. 2 through Sept. 8; thereafter, shooting hours are one-half hour before sunrise to sunset.) Nov. 20–Nov. 25 Dec. 19 – Jan. 15 (Shooting hours are from one-half hour before sunrise until sunset during Nov. 20–25 & Dec. 19–Jan. 15 seasons.)	12	24	None
RAILS, MOORHENS & GALLINULES				
Moorhens and Gallinules	Sept. 4 – Nov. 11	15	30	None
Clapper Rail, King Rail	Sept. 4 – Nov. 11	15	30	None
Sora Rail, Virginia Rail	Sept. 4 – Nov. 11	25	25	None
CANADA GEESE	Sept. 5 – Sept. 30 (Except N.E. counties)[1] Sept. 1 – Sept. 20 (N.E. counties)[1]	5	10	None
MIGRATORY WATERFOWL	Federal regulations may be obtained by contacting a license agent or by calling toll free 1-800-675-0263 after Labor Day.			
EXPERIMENTAL TEAL SEASON	Sept. 7 – 16 (east of U.S. 17 only)	4	8	None
DEER		2	6[2]	6[2]
Bow and Arrow	Sept. 11 – Oct. 7 (Eastern)[3] Sept. 11 – Oct. 7 and Oct. 16 – Nov. 18 (Western)[3] Sept. 11 – Nov. 4 (Central)[3] Sept. 11 – Nov. 11 (Northwestern)			
Muzzleloading	Oct. 9 – Oct. 14 (Eastern)[3] Oct. 9 – Oct. 14 (Western) Nov. 6 – Nov. 11 (Central)[3] Nov. 13 – Nov. 18 (Northwestern)			
Gun	Oct. 16 – Jan. 1 (Eastern)[3] Nov. 20 – Dec. 9 (Western)[3]			

Gun, Either Sex and Special, Either Sex	Nov. 20 - Dec. 9 (Northwestern) See *2000-2001 North Carolina Inland Fishing, Hunting and Trapping Regulations Digest*			
BLACK BEAR	See *Regulations Digest*	1	1	1
WILD BOAR	Oct. 16 - Nov. 18 and Dec. 11 - Jan. 1	1	1	2
RED & GRAY SQUIRREL	Oct. 16 - Jan. 31	8[4]	16	75
FOX SQUIRREL	Oct. 16 - Dec. 30 (Only in 20 counties; season closed elsewhere; see *Regulations Digest*)	1[4]	2	10
COMMON SNIPE	Nov. 15 - Feb. 28	8	16	None
QUAIL	Nov. 18 - Feb. 28	8	16	None
RUFFED GROUSE	Oct. 16 - Feb. 28	3	6	30
RACCOON & OPOSSUM	Oct. 16 (sunrise) - Feb. 28	No restriction on opossum See *Regulations Digest* for bag limits on raccoon		
RABBIT	Nov. 18 - Feb. 28	5	10	75
Rabbit—Box Trapping	Nov. 18 - Feb. 28			
PHEASANT—Non-native Male Pheasant Only	Nov. 18 - Feb. 1	3	6	30
WOODCOCK	Dec. 18 - Jan. 15	3	6	None
BOBCAT	Oct. 16 - Feb. 28[5]	No restriction		
FOX	See *Regulations Digest*			
GROUNDHOG	No closed season or bag limits			
COYOTE	No closed season or bag limits			
NUTRIA	No closed season or bag limits (except Currituck County, see *Regulations Digest*)			
WILD TURKEY	April 14 - May 12[5]	1	2	2
Bearded Turkey Only				

[1] Counties in N.E. Season are: Bertie, Camden, Chowan, Currituck, Dare, Hyde, Pasquotank, Perquimans, Tyrrell and Washington.
[2] See *Regulations Digest* for buck bag limits.
[3] See *2000-2001 North Carolina Inland Fishing, Hunting & Trapping Regulations Digest* for approximate boundaries of Eastern, Central, Northwestern and Western deer seasons. For a copy of the *Digest*, write: N.C. Wildlife Resources Commission, 1722 Mail Service Center, Raleigh, N.C. 27699-1722.
[4] Total limit of 8 squirrels per day of which one can be a fox squirrel.
[5] Season varies by county; see *2000-2001 Regulations Digest*.

hawks on a fall wind

Hawks follow well-established migratory paths over our coast and mountains each fall. Join the crowd and enjoy some thrilling autumn hawk watching.

written by David S. Lee ©2000

MASLOWSKI WILDLIFE PRODUCTIONS

Though the seasonal migrations of birds are fascinating, they are difficult to observe firsthand. Most land birds migrate at night, high above, or far at sea. Their migrations, generally 1,000 or 2,000 feet above the earth, are something most people never get to see. If you want to see and identify migrating birds, hawks are some of the few available subjects. They migrate by day and fly at altitudes that make them visible to anyone taking the time to look up.

Back when I was teaching in Maryland, I really got into fall hawk watching, and my students did too. Instead of them having to listen to me drone on about allopatric and sympatric populations or the effect of Pleistocene climates on current zoogeography, we trekked up to the roof to identify and count migrating hawks. It is amazing what students will do to get out of formal classes. To impress me with the sincerity of their newfound interest, most managed to locate their own binoculars and bird field guides. Within a matter of days, I found that students were skipping study halls, cutting classes, taking their lunch to the roof and even coming to school early to assist with the hawk counts. The school roof was populated through every period of the school day, and a close inspection of the students showed that a number of them were not even in my classes. By late October we had biology teachers, principals and science supervisors from all over the county coming to see what this was all about. English teachers allowed students to slip off to the roof if they promised to write mini-essays on hawks, and math students escaped Algebra II in return for working up statistics. I didn't fully understand it, but watching hawk migrations became quite addictive. In total we identified 1,526 individual hawks of a dozen species and calculated that more than 4,000 individual

A merlin (facing page) *swoops through the air as it crosses North Carolina. During their fall migration, numerous species of hawks, such as the red-tailed hawk (above), can be seen above the Tar Heel state.*

ARTHUR MORRIS/BIRDS AS ART

hawks migrated over our observation station during the fall of 1973.

One of the first things I did when I moved to North Carolina was to renew my hawk addiction. It is well known that many migrating hawks follow specific routes along mountain ridges. By the mid 1970s a number of North Carolina hawk-watching sites were already known. At the time, it wasn't well known that hawks followed southeastern coastal routes. South of Cape May, N.J., and to a lesser extent the lower Delmarva peninsula, no systematic coastal hawk watching had been conducted. The few reports of fall bird migrations along the Outer Banks suggested that this was not a major flight path for raptors.

Even so, I traveled to a location north of Cape Hatteras and perched atop a dune in hopes that I was beneath a flyway. But having not spied any hawks initially, I soon developed doubts about my choice of a monitoring site that first autumn. I recalled a study from the early 1900s on hawk migrations at Cape Charles at the extreme southern end of the Delmarva peninsula. Observations of migrating hawks showed that the birds were reluctant to fly over open water. When they encountered the wide expanse of water at the mouth of the Chesapeake Bay they turned north and presumably crossed the bay at some point where it was narrower. So perhaps hawks did not migrate down the Outer Banks at all, and traffic was simply diverted by the Chesapeake Bay. Was the lack of reported coastal hawk migration actually because no hawks migrated here?

Then one morning the sky was full of hawks. I saw a dozen just driving the short distance to my lookout. By 7 a.m. they were coming so fast that I had trouble tallying them on my clipboard. I had to wait for breaks in the flights in order to be able to look down long enough to fill in the data. Kestrels were flying by within 10 feet of me, ospreys were overhead, sharp-shins and merlins were working the myrtle thickets for warblers, and high over the sound flew individuals and groups of migrating accipiters. Many could barely be seen with the aid of binoculars and they could be identified as accipiters only by their alternate flap-flap-soar flight pattern. As best I could determine, they were all sharp-shins, but many were so high that it would have been impossible to distinguish the similar-appearing Cooper's hawks mixed in the flocks. The migration continued nonstop throughout the day and again the next morning until about 10 a.m. The amount of traffic varied, but even during the lulls it was unusual for five minutes to pass without seeing a hawk, and at times I was counting more than 250 individuals an hour.

Seasonal movement of birds is not a simple spring-north/fall-south thing, and the timing of the fall migration of hawks is no exception. Some species, such as broad-winged hawks, start migrating south in early August. The bulk of them have moved through our area before the first of September, well before fall even begins. Kestrels and other falcons migrate mostly in September, and other species, like red-tailed hawks and turkey vultures, are still migrating as late as Thanksgiving. For some the migration is explosive, with 80 percent or more of the entire population passing through an area in just a few weeks. For others the migration is quite protracted, and southward movement is masked by different age classes migrating at different times. Local movements of individuals and local sedentary populations of the very same species that is migrating all complicate our understanding.

After several weeks of coastal hawk observations, a pattern emerged of days with few if any hawks, followed by a burst

***The osprey (above) is** a fairly common hawk found along the coast. Fall bird-watchers gather on the dunes lining our beaches to catch a glimpse of hundreds of hawks migrating south.*

ARTHUR MORRIS/BIRDS AS ART

of activity. Research at migration points along Appalachian ridge tops showed a similar, though perhaps not as dramatic, pattern. So what was causing the flow of migration to turn abruptly on and off? The hawks were responding to cold fronts that moved across the nation.

Within a particular species' seasonal range of movement, weather becomes the driving factor that dictates when hawks move en mass. Though a few individuals of any species can be seen drifting south on almost any day, the days with numerous hawks really capture one's attention. As I learned in Maryland, even people not particularly in tune with the natural world can become quickly captivated if they encounter a number of hawks on the wing. Several times when I sat alone on the dunes near Hatteras trying to count hawks, people passing by stopped to see what I was doing. Within minutes many would be groping for my binoculars, thumbing through my field guides, and pointing out birds that I overlooked. It was not unusual to find them showing up the next day to assist me in my endeavor.

Everyone agrees that hawk flights can be quite unpredictable, but a few basics can increase the chances of catching the migration. The big factor is weather frontal systems, which hawks ride ahead of. The question is: Are the bulk of the migrants moving a few hours or a few days ahead of the fronts? Likely the speed of the fronts, direction of winds and location where the hawks were last deposited by the previous front all come into play. To try to understand this migration phenomenon, I needed to document the species' lack of movement, in addition to peak periods of migration. Some days were very good, and others were spent tallying monarch butterflies.

The other variable in migration is which hawks use which routes. The real differences between coastal and mountain hawk flights is not in the species but in the relative abundance of each species. I found that the buteos (broad-wings, red-shoulders and red-tails) do not use the coastal routes on a regular basis, and it was unusual to see more than one of these birds a day, even during peak periods of migration. To a lesser extent, the same was true of turkey vultures, which make up the bulk of the migration in our mountains.

Ospreys and marsh hawks, because of their primarily coastal distribution and diet of aquatic species, were seen regularly along the coast. Thus, they were common migrants along the Outer Banks. The bulk of the coastal hawk migrants were falcons (kestrels, merlins and peregrines) and accipiters (sharp-shins mostly, but a few Cooper's hawks used the route, too). A total of seven species of hawks were observed using the coastal routes, but falcons made up 10 percent, and accipiters 87 percent. Eighty-five percent of all the hawks counted were sharp-shins.

So why the coastal route? Updrafts off Appalachian slopes and thermals provide migratory pathways, which on the right days can allow hawks to fly all day without a single wing beat. This is not true on the coastal route, but most of the hawks migrating along the coast are not soaring species, or are at least ones in which this activity is not pronounced. It is important that the coastline provides an easy-to-follow visual corridor that from a hawk's-eye view, is a major interstate running southward. For individuals and species wintering in the Bahama archipelago and the Greater Antilles, south Florida provides a good jumping-off point for southerly flight plans. The most important factor is the large numbers of shorebirds and small songbirds that use the coastal route for fall migration. It's a fast-food restaurant, and for hawks—whose main goal is to get south—in-flight meals can be quickly obtained. While there is considerable overlap in the species using coastal and mountain routes, the composition of the species assemblages is quite predictable.

KEN TAYLOR

ARTHUR MORRIS/BIRDS AS ART

***The Cooper's hawk** (above) is one of many hawk species that declined because of the chemical DDT. However, since the pesticide's ban, the Cooper's hawk has rebounded as well as the American bald eagle, kestrel and osprey.*

Typically, coastal migrating hawks fly high. In some cases they appear as just specks, and one needs binoculars to identify them. Identification is at first frustrating, but the silhouettes of the different types are distinct, as are their flight styles. Still, many fly low enough to confirm field-mark identifications. Some individuals drop lower to forage while in migration. You can tell when peregrines are in the area; all the resting shorebirds take wing and fly in synchronized, rapid, twisting, turning groups.

Merlins, like peregrines, hunt on the wing. And if you watch closely, you may see one dart through a flock of tree swallows and pluck one from the air. They are so fast that actually all you see is one less swallow and a few white breast feathers drifting toward the sand. Kestrels, the smallest of our falcons, can hunt on the wing or stop and perch over sites where they hope to spot grasshoppers and similar-sized prey. Power lines are the perfect height. On some days, there are almost as many perched kestrels as there are utility polls on the Outer Banks. The sharp-shins work the shrub thickets, zipping over, around and between the shrubs, hoping to flush migrating warblers. Once, I watched a sharp-shin tailing a marsh hawk. The reason for this behavior soon became obvious: the larger and slower harrier flushed small birds that it had no chance of catching. The faster sharp-shin then darted after the flushed birds.

Intrigued with reports of hawks reluctant to fly over large expanses of water, I wanted to see how the hawks behaved. So for several days I positioned myself at the extreme southern end of Hatteras Island. Most of the species continued southward toward Ocracoke Island. All the high-flying individuals continued without hesitation, and I assumed they could see the next island from their vantage point. On days of strong winds, the low-flying sharp-shins and a few of the others would turn, make several halfhearted attempts to continue onward and eventually head north. Whether they took cover for the night in the large pines in the Hatteras woods or continued on back up the banks is unclear. But the complete lack of sightings of northbound birds from any of my other observation points suggested that they just waited out the weather and then continued south.

Throughout eastern North America, there are a number of well-known hawk watching sites. At some of the more popular locations, people come by the hundreds on weekends to witness hawk migrations. At several sites, permanent monitoring stations have been established, and records of numbers, species and how they relate to weather patterns go back for decades. The information pooled from these sources

represents some of the longest-running monitoring programs for any type of wildlife on the continent. From this information, researchers have learned much about changing raptor populations. And since hawks are top-order predators, they provide a thermometer that measures the long-term health of ecosystems.

From my perspective, it would be intriguing to redo the study I initiated in the mid-1970s. Various species had been hard hit by the problems associated with DDT and other pesticides prior to that time, and most populations had not yet begun to recover. The peregrine falcons I spotted were certainly almost all individuals originating from the Greenland population. Now that eastern North American bald eagles, kestrels, Cooper's hawks, New England ospreys and North American populations of peregrines have all increased, it would be interesting to monitor the Outer Banks migration again.

From a hawk's point of view, this time of year means the nesting cycle is complete, and the young birds are now mostly independent of their parents. After a month or so in which young birds will sharpen their hunting skills, and after fattening up on the summer harvest, it will be time to move south. I wonder which of 20 places I want to go to intercept and witness the autumn spectacle. It would be interesting to go to the Chesapeake Bay Bridge-Tunnel to see if the birds are using the man-made over-water route of U.S. 17 as a visual line to lead them from the lower Delmarva to the northern Outer Banks. If they are actually doing this, it may explain why no one had reported coastal migrating hawks before the bridge was constructed.

Or I may go down to Hatteras and sit atop a windswept dune to view the spectacle that has so intrigued me. Though not sure where I'll be, I know the hawks will be on their assigned routes. Birds, migratory hawks in particular, are not as free as one would imagine. They are captives of innate programming, the behavior of prey species, seasons, photoperiod and weather. Their daily planning calendars are much less flexible than yours and mine. Filling the obligations on their fall calendar is critical, and they must be prepared to go when the winds of September whisper in their ears. ⊠

David S. Lee is a curator of birds at the N.C. State Museum of Natural Sciences.

ARTHUR MORRIS/BIRDS AS ART

Where to Watch *hawks*

Almost any day and any place in the late summer to early fall can be good for watching hawk migrations in the mountains. Days with clear skies and northwest winds are best. Along the coast, September through early November is a good time. Northwest winds and clear skies seem to be optimal.

Coastal Sites:
Jockey's Ridge State Park in Nags Head; the extreme north end of Pea Island, north of Buxton where the island is most narrow; the north end of Bogue Banks; and Fort Fisher.

Mountain Sites:
Roan Mountain; Grandfather Mountain; Mahogany Rock Overlook near Doughton on the Blue Ridge Parkway; Cedar Ridge Trail near Sparta off the Blue Ridge Parkway; Flat Rock Ridge Trail near Sparta off the Blue Ridge Parkway.

Accipiter: Cooper's Hawk, Sharp-shinned Hawk, Northern Goshawk

Osprey

Falcon: American Kestrel, Merlin, Peregrine Falcon

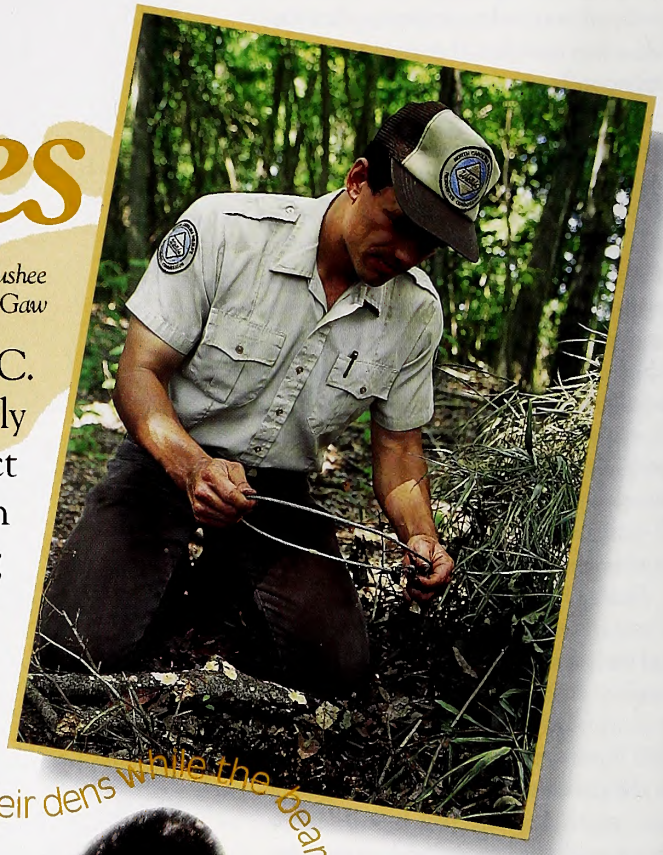
Turkey Vulture

Buteo: Red-tailed Hawk, Red-shouldered Hawk, Broad-winged Hawk

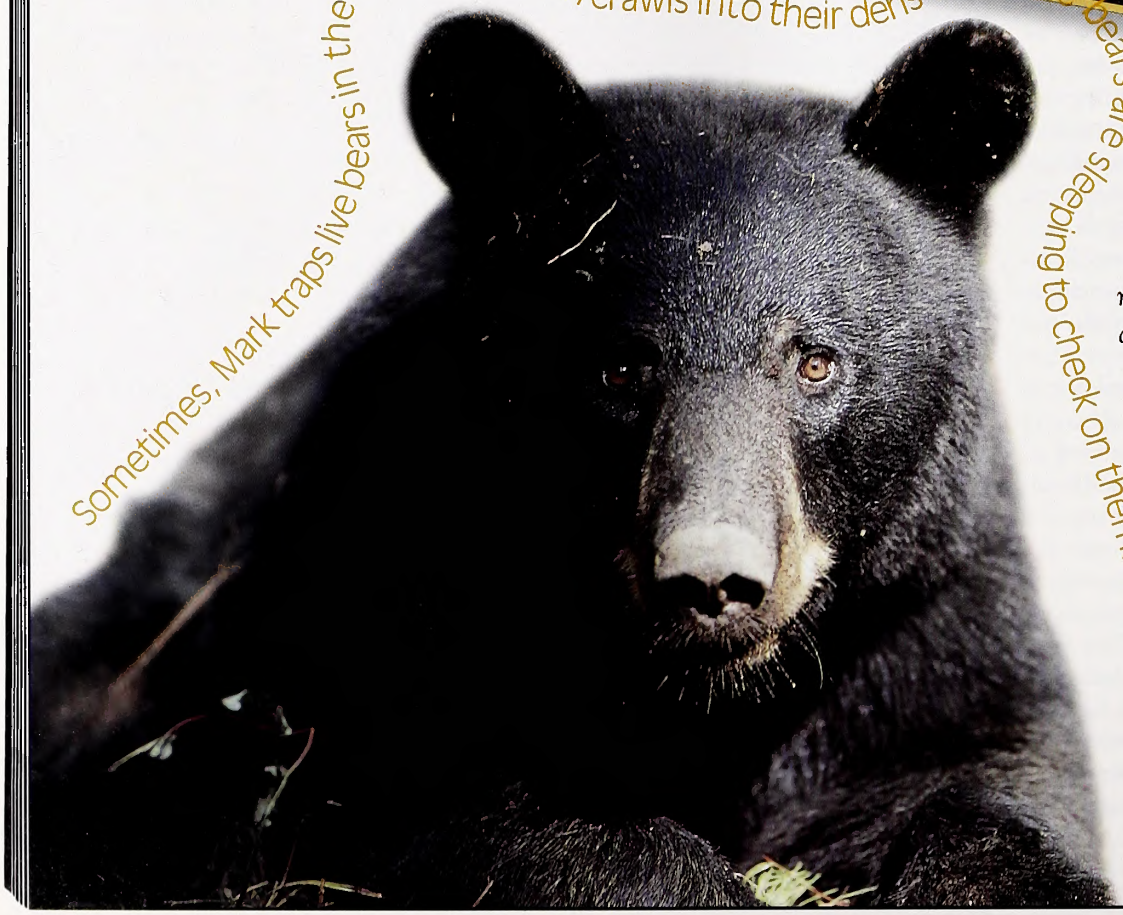
MEET BEAR BIOLOGIST Mark Jones

written by Rodney Foushee
photographed by Melissa McGaw

Mark has been working for the N.C. Wildlife Resources Commission for nearly six years. As the state's black bear project leader, he monitors wild bears in North Carolina to make sure they are doing well. With 9,000 bears spread across 54 counties, that's a lot to keep up with.



Sometimes, Mark traps live bears in the woods and even crawls into their dens while the bears are sleeping to check on them. Now that's exciting!



As a kid, I grew up in the Virginia mountains where there were plenty of bears. As long as I can remember I loved the outdoors and wildlife, but I never knew there was such a job as a wildlife biologist until I got to college. As soon as I learned about this, I knew this was the job for me! I like the thought that what I do may ensure that bears are around in North Carolina for future generations.

how does a biologist monitor a bear?

Basically my job is to monitor North Carolina's bear **population** and make recommendations on how to manage these animals. It is important to have bears around, but sometimes there can be problems when there are too many people living in the same area with bears. Hunting provides one way to keep a bear population at a level where people and bears can live together. A bear **sanctuary**, on the other hand, provides a safe place for female bears to raise their cubs.

Live trapping bears is very important in my job because I can learn about the bears' overall health, ages and whether specific bears are related. Once a bear is captured, I can also attach a radio transmitter collar to the bear to track it using **telemetry**. I can learn a lot about its **home range**, denning site and **habitat** needs.

Bears are normally secretive, shy animals, so catching one is not easy. First, you have to study what habitat they like. Bears prefer large, unbroken forests that provide food and plenty of cover. In the mountains, you might find them in a mature hardwood forest. At the coast, bears prefer swampy, bottomland forests and **pocosins**.

Once I trap a bear, I give it a drug to **immobilize** it. Then, with the help of other biologists, we weigh the bear, check its body condition, determine its age and take a little blood for testing. If the bear has an injury, we give it **antibiotics** to help the bear get well. We also put a tag in the bear's ear to keep up with it if it is recaptured. Finally, we give the bear another drug that allows the bear to move again so it can return to the wild.

tag the bear's ear

take measurements

administer antibiotics

put on a radio collar

Questions & Answers:

What does a bear feel like?

Its hair is coarse, like that of a dog that stays outside most of the time. A bear is also warm when you touch it because its body temperature is higher than a person's.

Are you scared of bears?

No, I'm not afraid of bears, but I respect them. You have to respect a wild animal that is as large and powerful as a black bear—and you have to give it its space.

What if I see a bear in the woods?

If you see a bear, don't panic. Just stand upright and back slowly away from the bear. Whatever you do, don't try to feed bears even if they seem tame. And don't play with bear cubs if you happen to find one. Their mother is likely nearby and she can take care of them just fine.

LAWRENCE S. EARLEY

The future for bears in North Carolina really depends on people and whether we decide to set enough wild land aside for them. We've got to leave room for bears and other wildlife if we want them for the future.

Read and Find Out

- *Scientists Who Study Wild Animals*, by Mel Higginson, The Rourke Book Co. Inc, 1994.
- *Mammals of the Carolinas, Virginia, and Maryland*, edited by William David Webster, James F. Parnell and Walter C. Biggs Jr., The University of North Carolina Press, 1985.
- *Black Bear Country*, by Michael Furtman, NorthWord Press, 1998.
- *Walking with Bears*, by Terry D. Debruyn, The Lyons Press, 1999.
- *Bears: Polar Bears, Black Bears and Grizzly Bears*, by Deborah Hodge, Kids Can Press, 1999.

Get WILD

Advanced WILD Workshops:

Sept. 29-Oct. 1 – *Endangered Species*, Mountain Trail Outdoor School, Kanuga. Contact Paul Bockoven (828) 692-9136.

What Does It Mean?

population: all of the animals or plants that occur in a specific area

sanctuary: a reserved area where animals are protected from hunting or disturbance

telemetry: a method of tracking wild animals by attaching them with radio transmitters and using a receiver to locate their signal

home range: the amount of space an animal uses to obtain food, water and cover

habitat: food, water, cover and space suitable to an animal's needs

pocosin: a low, flat, swampy area dominated by thick evergreen shrubs

immobilize: to make something so that it can't move

antibiotic: a substance, produced by a living organism, which suppresses or destroys germs that cause disease

It's WILD!

Project WILD Activities for teachers and students that correlate to this topic include:

Wildlife Research: teaches students to identify reasons for research related to wildlife and to design and conduct a wildlife project.

Wildwork: teaches students to name and describe three wildlife occupations.

Which Niche?: teaches students to define ecological niches by comparing them with careers in their community.

Bearly Born: teaches students to identify similar survival needs of black bears and human babies

How Many Bears Can Live in This Forest?: teaches students to define a major component of habitat and identify a limiting factor.

Do **you** know the bear facts?

Test your knowledge of black bears by completing this quiz. You can read the answers beneath the questions by holding the page up to a mirror and turning it upside down! After you play the quiz, see whether your family can guess the answers.

1 What do bears eat and drink while they're hibernating?

Nothing! Bears do not eat, drink, or excrete body wastes for up to several months when they are hibernating during the winter.

2 How much does a newborn bear cub weigh?

Bear cubs weigh about half a pound when they are born, but within six months they gain 20 pounds.

3 What is a bear's favorite meal?

Black bears are omnivores just like you. But instead of a hamburger and fries, they choose insect grubs and berries for food.

4 What is the largest wild mammal found in North Carolina?

Black bears are the largest wild mammals found in North Carolina. Female bears can reach 300 pounds and males can top 600 pounds.

5 Where do most bears live in North Carolina?

Though most people associate bears in North Carolina with the mountains, more bears actually live along the coast. Chances are good that if you live within an hour's drive of the ocean or a sound, you have bears living nearby.

6 How fast can a bear run?

Black bears are excellent swimmers, climbers and runners. They have been clocked running at a speed of 35 mph over short distances.

7 What senses do bears use to find food?

Bears have poor eyesight and rely mostly on their senses of smell and hearing to get around and find food.

8 What is the average life span of a bear?

Bears, on average, live 4 to 5 years in the wild, but the oldest wild black bear on record was 30 years old.

9 How many acres of bear sanctuaries can you find in North Carolina?

North Carolina has nearly 400,000 acres of land set aside for bear sanctuaries.

Wildlife to Benefit from Governor's Million Acres Initiative

DIVISION OF PARKS AND RECREATION

***A recent initiative** by Gov. Jim Hunt to protect a million acres within the next 10 years should reap substantial dividends for wildlife habitat. The million-acres goal was recently signed into law by the General Assembly.*

Edited by Chris Powell

Considered a shrinking asset in a growing state, wildlife habitat could receive a significant boost, as a result of a recent initiative by Gov. Jim Hunt to protect a million acres within the next 10 years.

The million-acres goal was signed into law during the most recent session of the General Assembly. The legislation provided needed funding for the land-preservation program and laid the groundwork for a Million Acres Advisory Panel to oversee the effort.

"Now we must move forward on building the partnerships between individual property owners, the private sector, conservation organizations and state and local government that can bring our million acres initiative to life," Gov. Hunt said. "Preserving one million additional acres of land in our state will ensure that we protect what we've been given at the same time that we continue to grow and build opportunities for the people of our state."

Though it was a tight budget year, $1.5 million was earmarked for the North Carolina Farmland Preservation Trust Fund, administered by the N.C. Department of Agriculture, and $200,000 was set aside for a computer database of land-use maps to track the program's progress.

However, in the future, the million acre goal could mean more funding for the Clean Water Management Trust Fund and the Natural Heritage Trust Fund. Monies from these funds have aided the purchase of considerable acreage for the Wildlife Commission, one of the largest land-holding agencies within state government, said Wib Owen, section manager of the Wildlife Commission's Land Management and Budget Section.

"All total, the Wildlife Commission owns about 350,000 acres of the 1.8 million acres in its game land program," Owen said. "In 1999, we were able to acquire 7,000 acres, much of it with financial assistance from the Clean Water Management Trust Fund and the Natural Heritage Trust Fund."

The Million Acres initiative has also been widely applauded by conservation groups who have been able to use the funding to protect private property through land purchases and conservation easements.

"The Conservation Trust for North Carolina as well as the other private nonprofit land trusts are enthusiastic and pleased by the governor's initiative and the legislative mandate," said Chuck Roe, executive director for the Conservation Trust for North Carolina. "The governor's statements are encouraging private landowners to enter into long-term conservation agreements with land trusts as well as encouraging acquisition of public land. It is a foundation for what we are all about."

North Carolina's population is expected to increase by 2 million people by 2020. Urban areas have increased by 88 percent since 1985, and more than 156,000 acres of famland and forests per year were lost to development between 1992 and 1997.

—Chris Powell

Ducks Unlimited Funds Half of Waterfowl Impoundment Improvement

Ducks Unlimited recently presented a $60,112.01 check to the N.C. Wildlife Resources Commission, following the completion of several improvements to the Catfish Lake Waterfowl Impoundment, located in Jones County.

The project involved the purchase of two new water pumps and an engine power unit, dike repairs and stabilization, roll chopping (a bladed roller used for site preparation), liming and seeding. The total cost of this project amounted to $120,224.02, of which Ducks Unlimited paid half.

The work will help better manage water levels in the impoundment for the benefit of waterfowl, wading birds and shorebirds.

—Courtesy of the Division of Wildlife Management

KEN TAYLOR

***Pintails and other** ducks like these will find accommodations at the Catfish Lake Waterfowl Impoundment more to their liking, thanks to a cooperative effort between the N.C. Wildlife Resources Commission and Ducks Unlimited.*

Wildlife Commission Web Site Receives Facelift

To provide a more user-friendly service, the N.C. Wildlife Resources Commission's Internet site was recently overhauled, making key information much more accessible.

The new home page will be located at the Web address: www.ncwildlife.org. Lee Ratcliffe, the Commission's new Web site administrator, said one of his initial goals will be to enhance the service capabilities of the site.

"Visitors will notice that the web site has a new look," Ratcliffe said. "From the home page, there will be links to categories such as wildlife conservation, licenses, regulations, fishing information, boating access areas, game land maps and much more."

Also, in the near future, visitors will be able to use their credit cards to securely purchase subscriptions to *Wildlife in North Carolina* and other educational products online.

—Chris Powell

Bigger Bucks

Dear Wildlife:

I am a 19-year-old hunter, writing regarding the article "Building Bigger Bucks," in your June 2000 issue. I live in the mountains and think it's great that many hunters, with whom I share the woods, want more and bigger bucks, too. I only kill one buck a year at most. Hopefully, every hunter in the Tar Heel State will read this article and support the two-buck limit.

—Christopher R. Cain, Fairview

North Carolina Outdoor Calendar of Events

On several occasions, events in this calendar have been changed without notice. Readers should check with the contact listed before traveling to an event. Items for listing should be conservation oriented and should be sent at least four months in advance.

Sept. 13, 14, 16

The Pisgah Center for Wildlife Education, located near Brevard, will conduct the Nature Nuts–Spiders program Sept. 13 from 1 to 3 p.m; Sept. 14 from 1 to 3 p.m. and Sept. 16 from 9 to 11 a.m. Nature Nuts is a program series for young children, ages 3 to 7, and their parents or guardians. Each program focuses on a different wildlife theme and includes stories and activities that engage children with the natural world. For more information, call (828) 877-4423.

Sept. 16

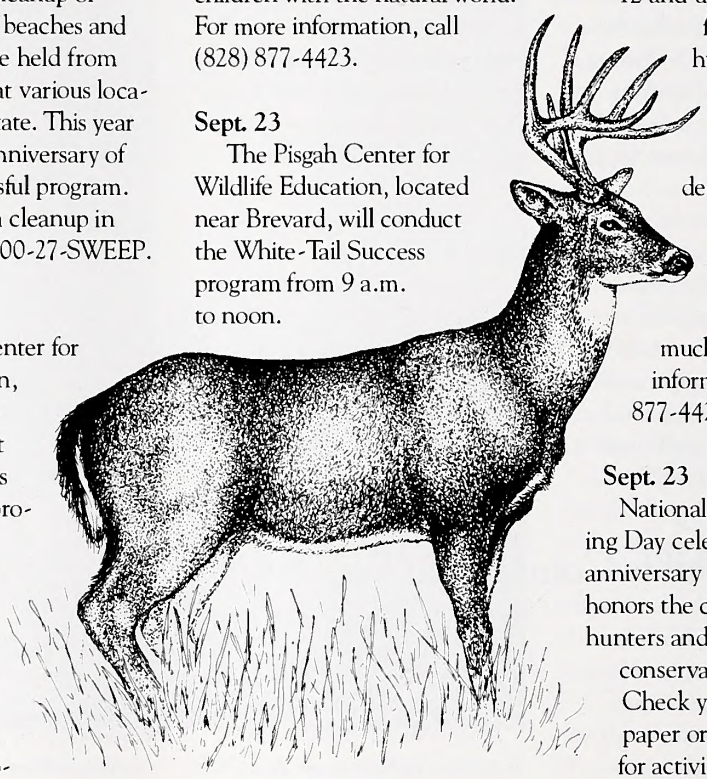
Big Sweep, a cleanup of North Carolina's beaches and waterways, will be held from 9 a.m. to 1 p.m. at various locations across the state. This year marks the 14th anniversary of this highly successful program. To volunteer for a cleanup in your area, call 1-800-27-SWEEP.

Sept. 20

The Pisgah Center for Wildlife Education, located near Brevard, will conduct the Eco-Explorers –Bird Watching program from 1 to 3 p.m. Eco-Explorers is a program series for children, ages 8 to 13. Each program focuses on a different eco-investigation that engages children with the natural world. For more information, call (828) 877-4423.

Sept. 23

The Pisgah Center for Wildlife Education, located near Brevard, will conduct the White-Tail Success program from 9 a.m. to noon. Designed for participants ages 12 and up, this program focuses on tips for hunting white-tailed deer. Experienced deer hunters will discuss deer behavior, scent use, stand placement, use of camouflage, safety concerns and much more. For more information, call (828) 877-4423.



Sept. 23

National Hunting and Fishing Day celebrates its 29th anniversary this year. The day honors the contributions of hunters and anglers to the conservation movement. Check your local newspaper or sportsman's clubs for activities and events.

Wildlife Commission Fisheries Biologists Gear Up for Shad Stocking

KEN TAYLOR

The Wildlife Commission's Division of Inland Fisheries recently began hatching and rearing American shad to be used for stocking.

Adult American shad will be collected from the Meherrin, Tar and Neuse rivers, then transported live to the U.S. Fish and Wildlife Service's Edenton Hatchery and then to the Wildlife Commission's Watha hatchery. Upon arrival, the shad will be injected with hormones to induce the release of eggs. Male and female shad will then be placed in large tanks to spawn.

After the eggs hatch and the fry are about 15-days old, they will be immersed in a harmless chemical that permanently stains their ear bones (otoliths). The shad will then be stocked in the Roanoke River as part of an ongoing effort to restore this population to historical levels. Within the next few years, biologists will sample returning shad to detect the presence of shad with stained otoliths, which will indicate the fish that originated from the hatcheries.

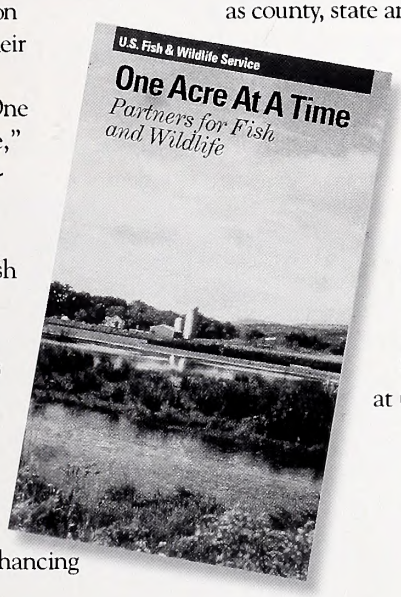
—Courtesy of the Division of Inland Fisheries

***The Wildlife** Commission is currently undergoing an extensive effort to bring back American shad (left) to their historic levels.*

"One Acre at a Time" Video

The U.S. Fish and Wildlife Service recently produced an educational video that is now available for private landowners interested in implementing conservation practices on their property.

Entitled "One Acre at a Time," the video highlights the agency's Partners for Fish and Wildlife Program, which provides technical and financial assistance to landowners voluntarily restoring or enhancing fish and wildlife habitat on their property.



These projects are flexible for the landowner and can involve cooperative partners such as county, state and federal agencies or corporations and conservation groups.

To obtain a copy of the video, call the Service's Broadcasting and Audiovisual Services Office at (202) 208-5611.

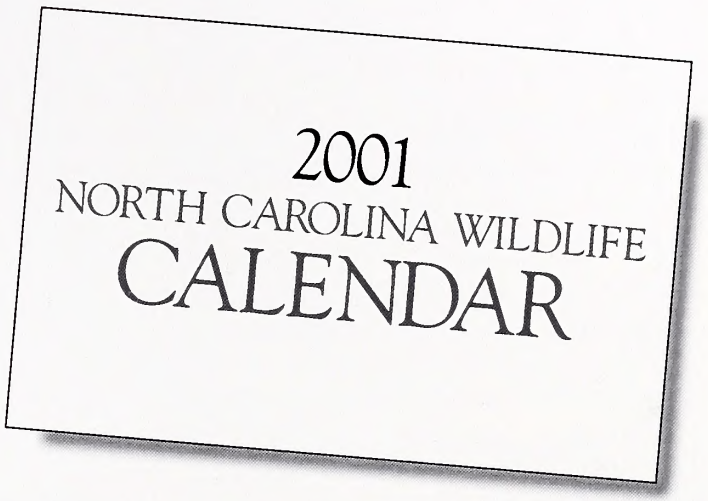
—Courtesy of the U.S. Fish and Wildlife Service

On Patrol

Editor's note: *Listed below is a report of a situation that exemplifies the always-unpredictable nature of North Carolina Wildlife Resources Commission enforcement officers' and biologists' duty.*

While off duty, Senior Wildlife Officer Mark Rich stopped by a local pet shop in Elizabeth City, where he saw what appeared to be piranhas for sale. Officer Rich informed Master Officer Norman Watts and fisheries biologist Chad Thomas, and the pair confirmed that the fish were indeed piranhas—known for their sharp teeth, strong jaws and carnivorous appetites. Because it is illegal to import or possess piranhas, the owner of the store was cited. While trying to remove the piranhas, one jumped out of the net and landed on the floor. Reaching down to retrieve the fish, Thomas received a quick lesson in *Piranhas 101* when the fish bit him on the finger. Then while arranging the fish on a table to be photographed for evidence, Thomas graduated from *Piranhas 101*, when the same fish jumped almost a foot off the table and bit his hand. Despite the fish leaving a toothy imprint, Thomas said he was not seriously injured and, in retrospect, found the situation humorous. (No wonder those vicious rascals aren't welcome here.)

The 2001 North Carolina Wildlife Calendar Is Here!



With such fine artwork as Cotton Ketchie's "Life on Ocracoke" (featured on the inside back cover), the 2001 North Carolina Wildlife Calendar is sure to sell out. In addition to Ketchie, the works of Robert B. Dance, Robert C. Flowers Jr., Duane Raver, Dempsey Essick, Tim Larson, Keith Hendrickson, Curwood Harrison, James A. Brooks, Mel Steele, Robert Herr and Amy Gardner Dean are featured.

Order yours today! Payment must accompany your order. Calendar orders may be charged to VISA or MasterCard, or enclose your check or money order (payable to NCWRC). Complete the form below and mail with payment to:

2001 Calendar, N.C. Wildlife Resources Commission
1710 Mail Service Center, Raleigh, NC 27699-1710
(Office is located at 322 Chapanoke Road in Raleigh.)

A GREAT GIFT!

Please send me _____ calendars at $6.00 each .....$_____

All N.C. residents add $.36 sales tax per calendar ..... _____

☐ Enclosed is my check for **total** payment of .....$_____

☐ Charge to MasterCard or VISA for the calendar(s) ordered above. My card number is _____ and the expiration date is _____/_____.

_____ (_____)_____
Card holder signature | Daytime Phone No.

If ordering 10 or more calendars, please provide your UPS deliverable address.

Name _____

Address _____

City/State/Zip _____

Phone (_____) _____

All orders must be prepaid. A $20 charge will be made on returned checks (N.C.G.S. 25-3-512). **For fund raising and bulk rate information (10 calendars or more), call 919-662-4377. Please allow 4 weeks for delivery.**

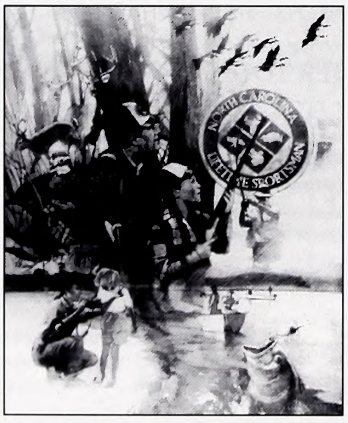
Catch Us at These Numbers

- **1-800-662-7137** to report violations of hunting and fishing laws.
- **1-800-628-3773** (NC VESSEL) for boat registration and titling.
- **1-800-675-0263** for hunting dates and shooting hours for migratory game birds.
- **1-888-248-6834** (2HUNTFISH) to purchase most licenses and *Wildlife in North Carolina* magazine subscriptions with VISA or MasterCard.
- **1-800-446-8663** (I GOT ONE) to report big game harvests.
- Connect to the Commission's online web site at **http://www.ncwildlife.org**

The N.C. Wildlife Resources Commission maintains five toll-free telephone numbers to provide better services and convenient access to information for North Carolina citizens. Calls are answered in order, but some numbers may require a wait during busy seasons.

VISA MasterCard

Wildlife Endowment Fund Report



Totals Through June 2000

Principal Balance
$30,185,308.53

Interest Earned
$31,014,863.02

Total Receipts
$61,200,171.55

Interest Used
$20,436,178.04

Fund Balance
$40,763,993.51

Established on May 29, 1981, this fund is derived from the sale of lifetime hunting and fishing licenses and lifetime subscriptions to *Wildlife in North Carolina* magazine as well as from tax deductible contributions. While the interest may be used to supplement N.C. Wildlife Resources Commission programs, the principal remains invested to generate additional interest for the future.

September Improvements

by Rodney Foushee

The arrival of cooler weather signals that fall is just around the corner. Here are a few things to keep in mind.

Cleaning Birdhouses: Now is a good time to clean and inspect birdhouses. After heavy use during the spring and summer, your birdhouses have likely accumulated nesting materials. Insects such as paper wasps also like to call nesting boxes home. It is a good idea to clean the nest boxes to remove insects, parasites and eggshells. If practical, take down the birdhouse and clean it with hot water, a mild detergent and a stiff brush. Thoroughly removing the debris minimizes parasites helping to ensure a healthy bird population. The clean nest box will also be more attractive to prospective feathered tenants come next spring.

DMAP: With the approach of deer season, now is a good time to consider improving the quality of the deer herd on your property or hunt club. If you manage or hunt in a club that contains at least 2,000 contiguous acres, you should consider enrolling in the Wildlife Commission's Deer Management Assistance Program. (If your club doesn't meet the minimum acreage, you can combine with adjacent landowners or clubs to enroll.)

After joining the program, a biologist will help you come up with a plan to manage your land and herd to meet your population objectives.

To assess your existing deer herd, you will need to provide detailed harvest records to the biologist. Though the deadline to enroll in the program for this season has past, you can make plans now to enroll your club in DMAP for next year. For more information on DMAP, call (919) 733-7291.

Planting Clover: Clover is one of the best wildlife foods that you can plant this month. It serves as good forage for a variety of species including deer, rabbits and turkeys. Clover also attracts insects so it will provide good foraging for young turkeys and quail next summer.

You can plant perennial ladino clover throughout September in the Coastal Plain and through mid-September in the Piedmont. Since clover doesn't do well in acidic or sandy soils, you need to get a soil test before planting. Adding the right amount of lime and fertilizer can make all the difference when it comes to a good clover patch.

N.C. WILD STORE

Dazzling Butterflies

We've chosen a brilliant selection of rare and common butterfly species for our newest posters. Seventeen common butterflies and 19 rare species, in all their radiant color, adorn the posters. Range maps depict where each butterfly is found, and informational text highlights the connections between the butterflies and their habitats.

Common North Carolina Butterflies

What's the wing span of a Question Mark butterfly? Learn this and much more from this educational poster. 22" x 34". $8.
ITEM CODE **P15**

Rare North Carolina Butterflies

Learn why these species are considered rare or endangered. 22" x 34". $8. ITEM CODE **P16**

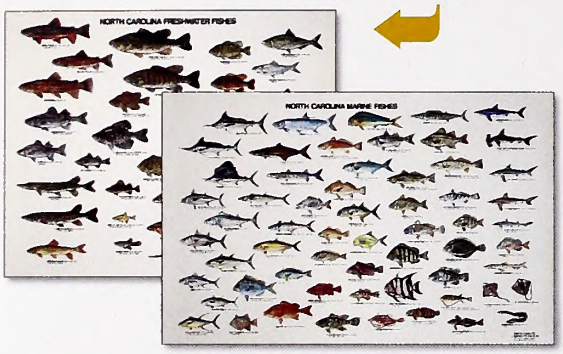
Butterfly Posters Set

Buy both posters and save! **$14.** ITEM CODE **P17**

All proceeds from the sale of these products support the development and production of conservation education projects and programs.

N.C. WILD STORE

North Carolina's freshwater fish and marine fish are colorfully displayed on individual posters, and feature the art of Duane Raver. Reel yours in today!



Fishes of North Carolina

Set of 2. Freshwater fish poster shows 36 state species (size 28" x 22 1/2"). Marine fish poster shows 60 species (size 35" x 22 1/2") $10.

ITEM CODE **P9**

Nature's Ways Collection

Explore the wonders of the natural world, wildlife species and ecosystems through "Nature's Ways." More than 200 essays from *Wildlife in North Carolina* have been compiled in a beautiful 6-volume paperback set. $27.50.

ITEM CODE **M9**

Also available as a boxed set. $30.

ITEM CODE **M10**

Before going on your next outdoor hike or camping trip, be sure you know North Carolina's reptiles.

Reptiles of North Carolina

Set of 4 posters in full color. Each poster decribes the species and denotes which reptiles are on the endangered, protected or special concern list. A set includes: lizards, turtles, and both live-bearing snakes and egg-laying snakes. Posters are sized 22" x 34". $18. ITEM CODE **P10**

Amphibians of North Carolina

The Hylid Frogs. North Carolina's tree frogs, cricket frogs and chorus frogs, belonging to the large family *Hylidae*, are presented in this colorful poster, one of two frog posters in the Amphibians series. 22" x 34". $6.

ITEM CODE **P11**

Amphibians of North Carolina

True Frogs and Toads. The second poster in the Amphibians series showcases true frogs and toads. Vibrant photos combine with informative text to make it a standout in the classroom or at home. 22" x 34". $6.

ITEM CODE **P14**

Waterfowl Decoys of N.C.

Nineteen classic waterfowl decoys from North Carolina's legendary days of waterfowl hunting have been collected for the first time on this framable, high-quality poster. This is the first in a series of "Sporting Heritage" posters. 22" x 34". $10.

ITEM CODE **P12**

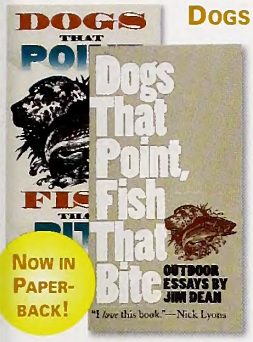
Traditional Trout Flies of the Southern Appalachians

Sixteen traditional trout flies are presented in stunning color detail. Each fly is accompanied by a brief history of its development and use in Appalachian waters as well as the components that make up each hand-tied creation. Second in a series of "Sporting Heritage" posters. 22" x 34". $10. ITEM CODE **P13**

Bird Houses & Feeders: How to Build and Enjoy Them

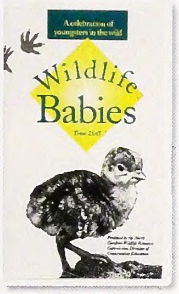
An eight-page illustrated guide to building bird houses and feeders. $2.

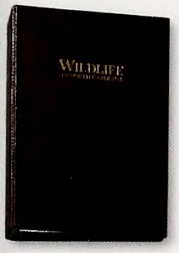
ITEM CODE **M6**



Dogs that Point, Fish that Bite

Here are 50 of the best "Our Natural Heritage" columns written by Jim Dean for *Wildlife in North Carolina* over the past 17 years. Published by the University of North Carolina Press and the N.C. Wildlife Resources Commission. 220 pages. Hardbound $19.95. ITEM CODE **M8**
Paperback $10.95. ITEM CODE **M12**





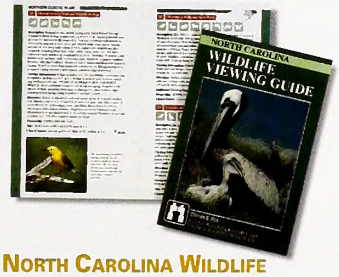
Magazine Binder

Store 12 issues of *Wildlife in North Carolina* in a sturdy binder. $10.
ITEM CODE **M2**

Wildlife Babies Video

Entertaining 25-minute video version of the classic 1965 Jack Dermid film reveals springtime antics of young wood ducks, black bear, possums, cottontails and others . $20.
ITEM CODE **N9**

Based on Chief Seattle's 1855 speech, the film's focus is on environmental ethics. Accompanied by This Land Is Sacred, this film is a must-see for everyone. It is destined to become a classic.



North Carolina Wildlife Viewing Guide

From Cape Hatteras to the Great Smokies, *North Carolina Wildlife Viewing Guide* will lead you to 90 of the state's premier wildlife viewing locations—and better your chances of seeing wildlife once you get there. $5.95. ITEM CODE **N6**

All Things Are Connected

Video and Activity Guide. $22.
ITEM CODE **W3**

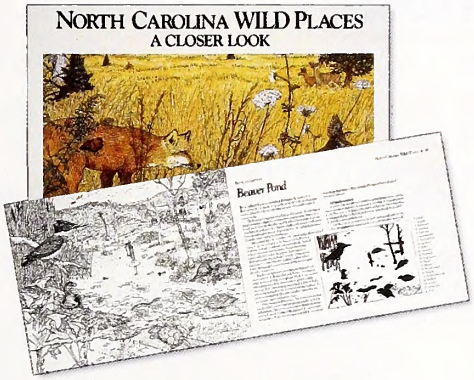
Gardens for Butterflies

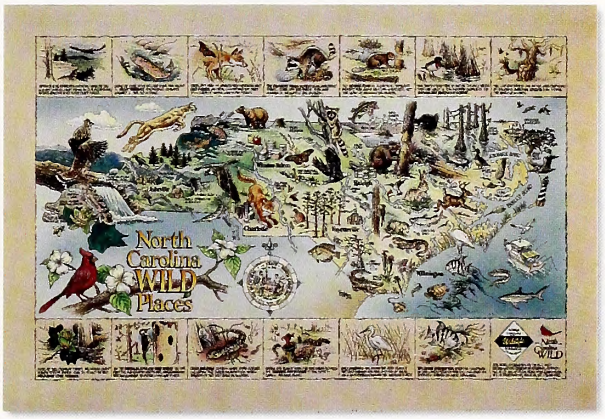
Article reprint from *Wildlife in North Carolina* magazine for the gardener who wants to attract some of nature's most colorful creatures. $2. ITEM CODE **M5**

Scouting Correlations

Cub, Boy and Girl Scout requirements are correlated to Project WILD and Aquatic WILD activities. Supplements Scout leaders' planning materials and events. Each $3.
Cub & Boy Scout Correlation. ITEM CODE **E9**
Girl Scout Correlation. ITEM CODE **E10**

North Carolina's wildlife habitats come alive in this 82-page, easy-to-read, soft cover book. With delightful illustrations by Anne Marshall Runyon, N.C. WILD Places covers 13 habitats across the state.





North Carolina WILD Places: A Closer Look

Book and Posters Set. With each book you'll receive two habitat posters (also by Runyon) and a N.C. WILD Places Map poster, featuring the art of Jackie Pittman. $16. ITEM CODE **E6**

North Carolina WILD Places Teacher's Guide

For teachers using *North Carolina WILD Places* in the classroom, these activities and games will heighten student awareness of wildlife habitats. $6.
ITEM CODE **E7**

More terrific items ☛

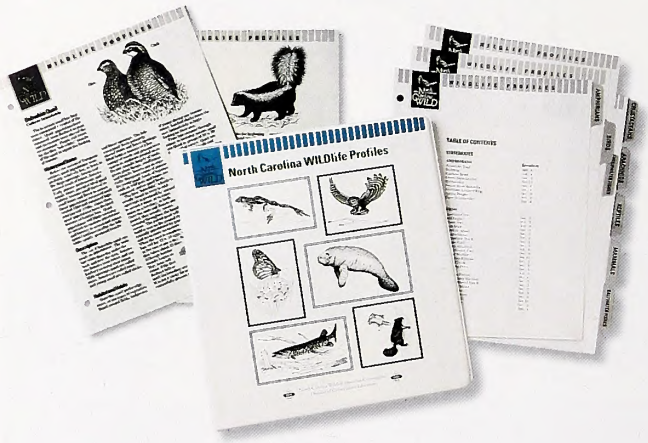
N.C. WILD STORE

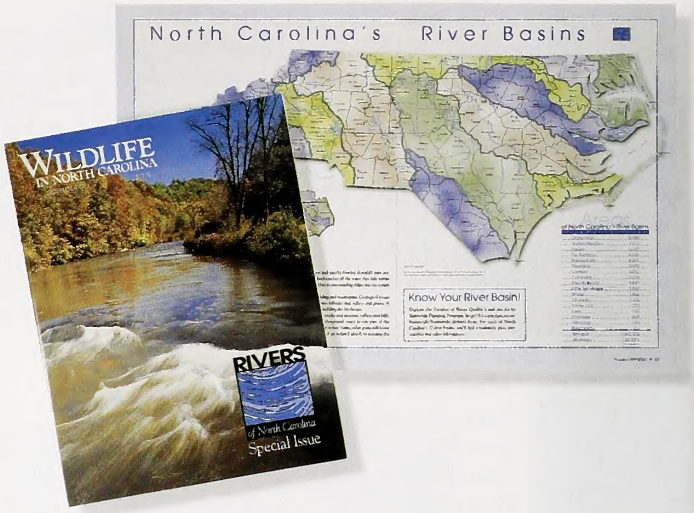
N.C. WILDLIFE PROFILES BINDER & N.C. WILDLIFE PROFILES SETS 1-12

This top-quality 3-ring binder includes:

- 120 illustrated fact sheets, each profiling an animal's history, status, habitat and behavior, and also containing a range map.
- Tab dividers that organize 12 sets of wildlife fact sheets by class.
- A table of contents, index and instruction sheet.

$30. ITEM CODE **W17**





RIVERS OF NORTH CAROLINA

This 128-page special issue of *Wildlife in North Carolina* examines issues relating to North Carolina's rivers, from canoe trips to water-quality to the real-life stories of people working to save our rivers.

For timely coverage of all of North Carolina's river basins, as well as eye-catching photos and educational maps and graphics, there's nothing else like it on bookshelves anywhere. Order "Rivers of North Carolina" for your own bookshelf, or give it to friends and family members to enjoy. For $10, plus shipping and postage, you'll have a coffee-table edition that's already being hailed as a classic. $10. ITEM CODE **M11**

EMBROIDERED CAPS

N.C. WILD Caps. N.C. WILD cardinal on two-tone, brushed-cotton twill cap with a Velcro® closure. **$16.50 each.**

- Tan cap with forest green bill. ITEM CODE **A1**
- Tan cap with burgundy bill (not shown). ITEM CODE **A10**

Wildlife in North Carolina Caps. Exclusive designs and magazine logo are featured on four different cap styles. **$16.50 each.**

- Brook trout on sage-colored, brushed cotton cap with an unstructured front, extended bill, and nubuck suede closure. ITEM CODE **A3**
- Deer silhouette on Advantage® Camouflage cotton cap with tan suede bill. ITEM CODE **A6**
- Deer silhouette on blaze orange cap with brown waxcloth bill. ITEM CODE **A7**
- Deer silhouette on 6-panel, solid back cap. Advantage® Camouflage on cap and bill with plastic snap. (not shown) ITEM CODE **A11**

PISGAH CENTER FOR WILDLIFE EDUCATION T-SHIRT

100% cotton natural color tee with design on back and Pisgah logo on front. **$14.50.**
ITEM CODES:
A8MED (medium)
A8LRG (large)
A8XLG (extra large)
A8XXL (extra extra large)

WEE TEES

Just like the adult shirt with Pisgah design, only smaller.
ITEM CODES:
A9XS (extra small; size 2-4) $10.
A9SM (small; size 6-8) $12.50.
A9MD (medium; size 10-12) $12.50.
A9LG (large; size 14-16) $12.50.

WILDLIFE IN N.C. T-SHIRT

WINC magazine logo on front pocket. Tundra swan art on back. White.
$14.50. ITEM CODES:
A5MED (medium)
A5LRG (large)
A5XLG (extra large)
A5XXL (extra extra large)

N.C. WILD T-SHIRT

N.C. WILD logo printed on front and colorful art on back. White.
$14.50. ITEM CODES:
A4MED (medium)
A4LRG (large) ☛ SOLD OUT
A4XLG (extra large)
A4XXL (extra extra large)

The 2001 North Carolina Wildlife Calendar Is Here.

Cotton Ketchie's painting of "Life on Ocracoke" is a sample of the fine art featured in the 2001 North Carolina Wildlife Calendar. To order your calendar, see the convenient order form on page 35.

"Life on Ocracoke"
Cotton Ketchie

courtesy of James Alexander

2001 November

Sunday	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday
October S M T W T F S 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31	December S M T W T F S 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31	Fishing Days Best Good Fair Poor Moon Phases New Last Quarter Full First Quarter	To subscribe to WILDLIFE IN NORTH CAROLINA MAGAZINE call 1-888-248-6834	1 • Speckled trout fishing peaks	2	3 Invest in the future with a lifetime subscription to *Wildlife in North Carolina*
4	5	6 *Election Day*	7	8	9 • Wood duck migration peaks	10 • Peak deer rut in Coastal Plain
11 • Pintail and widgeon migrations peak *Veteran's Day*	12	13 • Green-winged teal migration peaks	14	15	16 • Groundhogs, chipmunks, skunks begin hibernating	17
18	19	20	21 Lifetime licenses . . . the ideal gift for that special sportsman	22	23	24

The View to Forever

Not all early successional habitats are as beautiful as this grassy bald on Roan Mountain where forest growth has been interrupted. Yet, open places like mountain balds are critical for many wildlife species. See story beginning on page 12.

Periodicals postage paid at
Hickory, North Carolina

LITHOGRAPHY BY THE HICKORY PRINTING GROUP,
CONOVER, NORTH CAROLINA

64/10
2

WILDLIFE IN NORTH CAROLINA

OCTOBER 2000 $1.50

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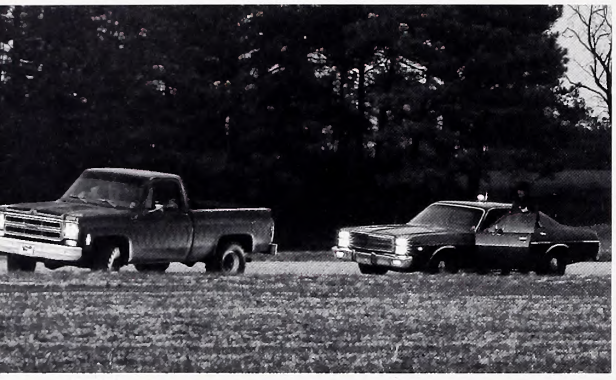
Deer in the Headlights

by Jim Dean ©2000

It was well past dark by the time Mary and I got our tackle stored in the back of the Bronco and chained the boat to the tree. Mary's second fish that afternoon had been a rambunctious 5-pound largemouth that she'd snaked out from under a willow on a soft plastic salamander, so we had understandably lingered on the pond until dusk. Then, Curtis and Louise who operate the farm had stopped by to bring us some blackberries and blueberries, and we sat together on the back porch talking for a long time.



KEN TAYLOR

About 10:30, Curtis and Louise were getting ready to go and Mary and I were gathering up our stuff to head back to Raleigh.

"Who's that coming in here so late?" asked Curtis, as the lights of a car appeared just beyond the crest of the hill past the fields and orchard. We waited, wondering, but whoever it was stopped. We watched for a moment, then the intentions of our visitor became abundantly clear. A brilliant spotlight flashed across the field towards the house where Curtis and Louise live, then lit the fields on the opposite side of the path.

"I know what that is," I said sharply, as I leaped off the porch and jumped into the Bronco. I left the lights off until I was at the top of the hill, then turned them on. A small truck with three men in the front seat slammed on brakes 30 feet in front of me, but I was alongside before they could turn around.

"What are you doing on this farm?" I shouted.

"We're just riding around, passing through," said the driver.

"The hell you are," I said. "You're firelighting deer, and you better get off this place right now."

Behind me, I could see Curtis racing up in his car. Outnumbered, the firelighters turned their truck around and left, but not before we got a good look at the license number.

"We heard a shot," Curtis told me before we headed back to the cabin. "We thought you might need some help."

I hadn't heard the shot because I was already gunning the Bronco up the hill by that time. In retrospect, confronting those fellows wasn't the smartest thing I've ever done. Maybe they were otherwise fine folks simply out for a lark, but shot or no shot, I had every reason to expect them to be armed, and they knew they were violating the law.

"We watched for a moment, then the intentions of our visitor became abundantly clear. A brilliant spotlight flashed across the field towards the house where Curtis and Louise live. . . ."

Firelighting, or spotlighting, deer has been a major problem in North Carolina and elsewhere for many years, certainly throughout the 28 years I worked for the N.C. Wildlife Resources Commission. One of my first assignments back in the early 1970s was to accompany wildlife enforcement officers on a stakeout trying to catch violators shooting deer under a powerful spotlight. "Like a deer in the headlights" is no cliché; deer really are disoriented and riveted to the spot when the light hits them. Back then, enforcement was hampered by the fact that it was legal in many counties to spotlight deer just to look at them, as long as you didn't have a gun. Now, that's illegal most everywhere.

Considering the high visibility of spotlighting and the odds that many violators are going to get caught, it is surprising how persistent this practice is. Citizens and landowners can certainly help, but wildlife officers have some advice they'd like us to consider. Don't confront violators—it's potentially too dangerous. If possible, use a cell phone or telephone to report any violation you witness (the toll free number is 1-800-662-7137, and it's manned 24 hours with instant radio contact to officers all over the state). If you can get a description of the vehicle or, better yet, a license number without endangering yourself, that's a big help. But be careful. An illegally killed deer isn't worth your life.

As for our little confrontation on the farm, I am happy to report that the suspects were tracked down and charged. Wildlife officers Tim Sasser and Mike Owens told me that the license number had been all they needed, and they were particularly pleased because a truck of this description had been implicated in some other possible violations.

There are more white-tailed deer in North Carolina than at any time in recorded history, and almost everyone who loves deer hunting is law-abiding. But you can bet they hate firelighters more than anyone.

Contents

Wildlife in North Carolina

Wildlife in North Carolina is the official educational publication of the North Carolina Wildlife Resources Commission. It is dedicated to the sound conservation of North Carolina's wildlife and other interrelated natural resources and also to the environment we share with them.

October 2000 *Volume 64, Number 10*

Features

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4 **October Means Wood Ducks** *written by David Hart* ©2000
North Carolina's best duck hunting doesn't always take place on the big marshes of the east. Hunters can find fantastic waterfowl opportunities on beaver ponds and small rivers close to home.

8 **Fall on the Water** *written by John Manuel* ©2000
Autumn can be a spectacular season for canoeing or kayaking. Take time out for some paddling action this fall on these four memorable waters.

14 **A Case for Management** *written by Lawrence S. Earley*
To restore some declining wildlife populations in the mountains, forest management practices are needed to create the open habitats on which they rely.

20 **Bridge Stripers** *written and photographed by Joel Arrington* ©2000
Hankering for some exciting coastal striper fishing this fall? Look no farther than the nearest set of bridge pilings.

24 **Gift of a Lifetime** *written by Chris Powell*
Nineteen years after its inception, the N.C. Wildlife Endowment Fund is hitting its monetary stride. It's giving sportsmen an opportunity to become shareholders in a creative investment strategy that helps wildlife.

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Departments

Our Natural Heritage *by Jim Dean* ©2000 ..... **inside cover**
Nature's Ways *by Jeff Beane* ©2000 2
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Cover *This bobcat is on the prowl at a timber harvest site in the Pisgah National Forest. Photograph by William S. Lea.* ©2000

Spilogale putorius
spilos: a spot; *gale*: a weasel; *putoris*: a bad smell

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Wildlife in North Carolina (USPS 683-980) (ISSN 0043-549X) is published monthly by the North Carolina Wildlife Resources Commission, 512 N. Salisbury St., Raleigh, N.C. 27604-1188. Periodicals postage paid at Raleigh, N.C. and additional mailing offices. Subscription rates: one year $7.50, three years $20, lifetime $100. All foreign subscriptions are $23.50 per year. For subscriptions from foreign countries, payment **only** by U S Postal Service money order or cashier's check drawn on a U.S. bank. All orders must be prepaid. Please allow 6 to 8 weeks delivery on new subscriptions and address changes. **POSTMASTER:** Send address changes to Circulation Manager, 1711 Mail Service Center, Raleigh, N.C. 27699-1711. Address all correspondence regarding subscriptions to Circulation Manager. If you have a problem with your subscription, dial (919) 662-4377. Articles in *Wildlife in North Carolina* may represent the personal views of authors, and do not imply endorsement by the North Carolina Wildlife Resources Commission. *Wildlife in North Carolina* is available on audio cassette as a courtesy of volunteer services of the Department of Cultural Resources, Library for the Blind and Physically Handicapped, Raleigh, N.C., (919) 733-4376. **The N.C. Wildlife Resources Commission is an equal opportunity agency.**

The Flipping Beetles

written by Jeff Beane ©2000
illustrated by David Williams

Insects fascinate most children. While there are hundreds of insect species with remarkable life histories, sooner or later the average child growing up in North Carolina will be entertained by the antics of a click beetle. Click beetles (family Elateridae) are slender, streamlined beetles with a unique feature—they can flip themselves into the air. This ability is due to some interesting anatomical features.

All insects have three main body sections—head, thorax and abdomen. The middle section—the thorax—is further divided into three parts. In click beetles, the first two of these parts—the prothorax and mesothorax—are loosely joined in a sort of moveable hinge. The underside of the prothorax has an elongated lobe or spine that fits into a groove on the underside of the mesothorax. When a click beetle finds itself on its back, it will arch its thorax upward, causing the spine to snap into the groove and producing an audible clicking or popping sound. When the tiny spine is released, the action propels the beetle into the air. Indeed, the beetle will flip into the air repeatedly until it lands right-side up and can scurry or fly to safety. Smaller click beetle species are usually more proficient at flipping than larger ones. A few other beetle families have limited clicking ability, but click beetles are the masters of the art.

About 7,000 species of click beetles occur worldwide, with about 800 of them in North America and approximately 100 in North Carolina. Among the most common species are those in the genera *Conoderus* and *Melanotus.* Adults are often found resting on the foliage of trees or shrubs, or under debris on the ground. Many are attracted to lights at night. Some click beetles are large and colorful, but most North Carolina species are brown or black, rather drab, and less than an inch long. An exception is the eyed elater *(Alaus oculatus)*—our largest and perhaps best known species, which reaches a length of over 2 inches. Its thorax is boldly marked with a pair of large ocelli or eyespots, which probably serve to startle potential predators. This beetle is often found under bark on fallen logs. The small-eyed elater *(A. myops)* is similar but slightly smaller, with proportionately smaller eyespots. It occurs mostly in pine logs, and the eyed elater is found more often in hardwood logs.

Female click beetles usually lay their eggs in soil, and the slender, hard-bodied larvae, known as wireworms, live in soil or decaying wood. Most wireworms feed on plant roots, tubers and underground stems, and some are agricultural pests. Many of these affect root crops such as carrots, beets and turnips, but some also damage the roots of wheat, corn, beans, tobacco, cotton and other crops. Some, however, are predaceous, eating other insects. These include the eyed elater, whose golden brown larva may reach 3 inches in length. Somewhat resembling a giant mealworm, it is often found in decaying logs and its mandibles can deal a painful pinch if the insect is handled carelessly.

Interestingly, most click beetle larvae take at least two years to mature, and a few species may take as long as 10. Most beetles have a life cycle of a year or less—even some of the larger scarabs mature in a year or two. It is unusual for small beetles like these to have such long life cycles. This is one reason why click beetles are not better understood and why some of the agricultural pest species are not more easily controlled. What graduate student could afford to spend five or six years studying an insect for only a single generation?

One of the most astonishing things about click beetles is the g force (the force due to gravity upon an accelerating body) that they endure while jackknifing into the air. According to the *Guinness Book of World Records,* these beetles average about 400 g during a flip, and one British specimen was calculated to have endured a peak brain deceleration of 2,300 g at the end of one of its flips. (In contrast, a human was hospitalized for three days after enduring a force of 82.6 g for 0. 04 second on a water-braked rocket sled.) Think about that the next time you watch a click beetle flip!

This large family of beetles has been successful in the highly competitive insect world. For them, snapping under pressure evidently has its advantages!

Jeff Beane is a curator of reptiles and amphibians at the N. C. State Museum of Natural Sciences in Raleigh.

Other Reading

- Arthur V. Evans and Charles L. Bellamy, *An Inordinate Fondness for Beetles* (Henry Holt and Co., 1996).
- Richard E. White, *A Field Guide to the Beetles of North America* (Houghton Mifflin Co., 1983).

Surfing the Web

- These web sites contain images and general information on click beetles. *Addresses:*

  http://collections.ic.gc.ca/biodiversity/family/Elateridae.html

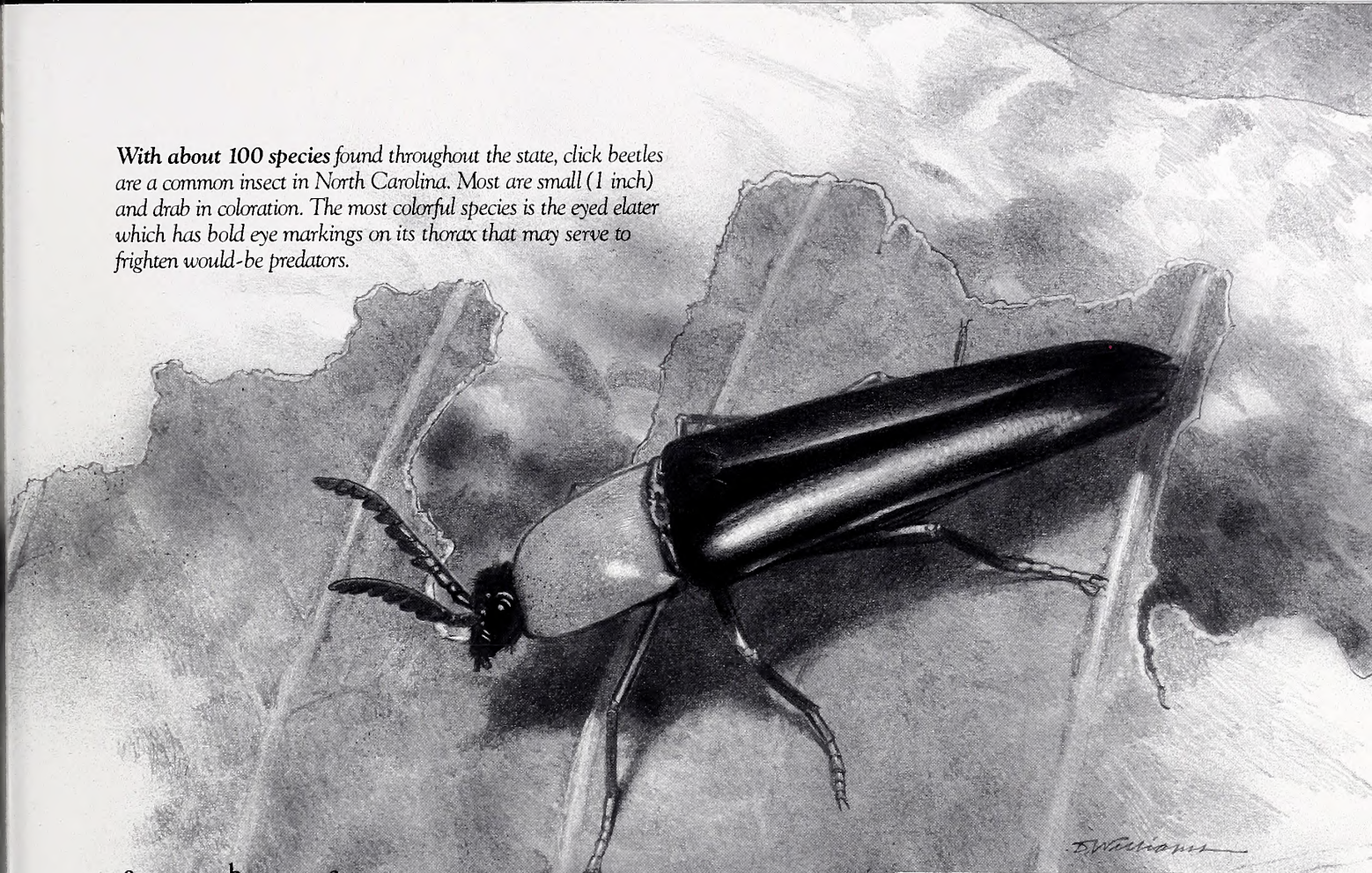
  http://www.newton.dep.anl.gov/natbltn/400-499/nb446.htm

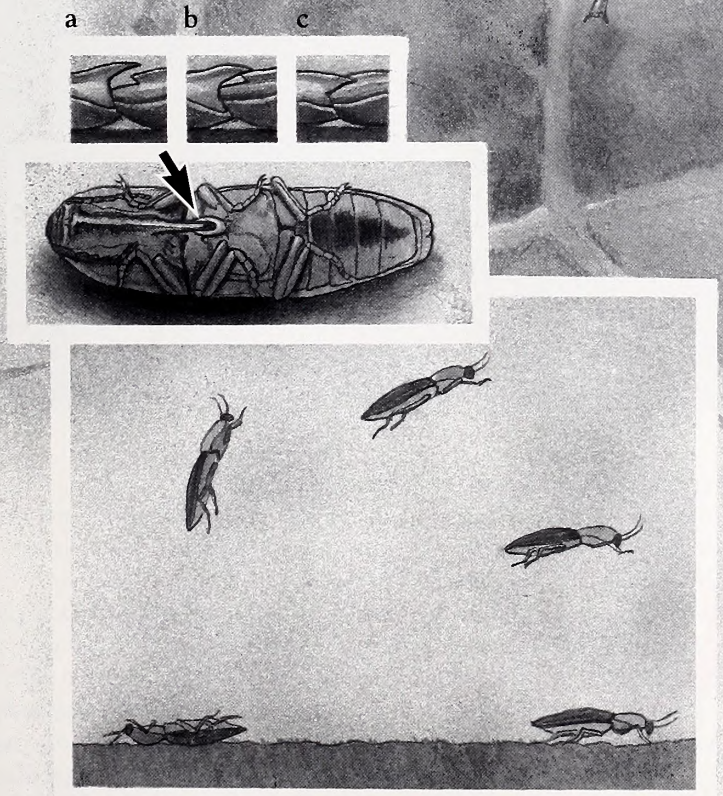
  http://troyb.com/photo/gallery/043-13-ClickBeetle.htm

  http://www.ent.iastate.edu/imagegal/coleoptera/click/

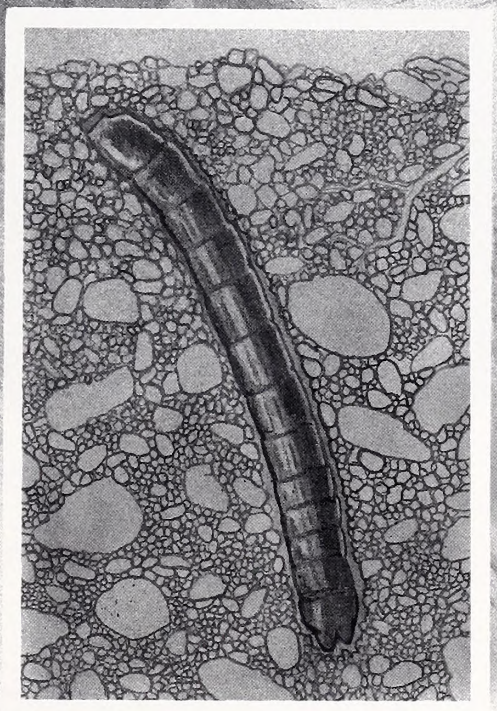
  http://www.ext.vt.edu/departments/entomology/factsheets/clickbee.html

With about 100 species *found throughout the state, click beetles are a common insect in North Carolina. Most are small (1 inch) and drab in coloration. The most colorful species is the eyed elater which has bold eye markings on its thorax that may serve to frighten would-be predators.*





When a click beetle *is turned upside down, it can right itself by arching its thorax upward. This movement pushes a sharp spine on its back (a) into a groove (b, c), locking it into place. When the tiny spine is released, the action propels the beetle into the air where it may be able to turn itself right-side up.*



Click beetle larvae *are known as wireworms. Most feed on subterranean plant parts, and some are agricultural pests. A few eat other insects. Most wireworms take several years to mature.*

OCTOBER MEANS WOOD DUCKS

North Carolina's best duck hunting doesn't always take place on the big marshes of the east. Hunters can find fantastic waterfowl opportunities on beaver ponds and small rivers close to home.

written by David Hart ©2000

F. EUGENE HESTER

***Hunting for wood ducks** is waterfowling in its basic form. Whether walking stream sides or leaning against a beaver-pond tree, a hunter only needs a gun, waders and the optional dog.*

There's nothing like spending an icy morning hunkered down in a make-shift blind somewhere on the edge of a big marsh waiting for ducks to drop into a decoy spread. To many waterfowl hunters, that's the ultimate definition of a North Carolina duck hunt.

But vast tidal wetlands are a world away for some residents of the Tar Heel state, particularly for those who live west of Interstate 95. It's hard to justify a three-, four- or even six-hour drive for a day of duck hunting.

There is an alternative to a big-water duck hunt, however, and it's probably just a short drive away for practically anyone in the western two-thirds of the state. This time of year, when the leaves are starting to show a hint of their brilliant autumn colors, waterfowlers can have a grand time with wood ducks. The rivers and creeks that wind through the Piedmont and western highlands offer these colorful birds ideal habitat. That translates to an abundance of woodies and a great hunting opportunity.

"As far as we can tell, the wood duck population has been stable over the past several years. It's pretty hard to get an accurate estimate of their numbers because of the type of habitat they live in," said Dennis Luszcz, waterfowl project leader for the North Carolina Wildlife Resources Commission. "Overall, the number of wood ducks has probably increased in the last 20 years because of the increase in the number of beavers."

More beavers mean more beaver ponds, and that translates to prime living quarters for woodies. As their name implies, these ducks thrive on creeks, rivers and just about any other wet area within densely wooded habitat. They feed on acorns, a variety of soft

mast and invertebrates, and they nest in the hollow cavities of dead and living trees. In other words, wood ducks need woods.

To hunt these beautiful ducks, you need only a handful of gear. A straight-shooting shotgun, a few shells loaded with steel shot, six or seven decoys, a pair of waders or a canoe, and a light camouflage jacket round out the necessities of an early-season wood duck hunt.

Here's a look at a few tried-and-true methods:

BEAVER PONDS

Clinton resident Don Manley, eastern North Carolina's senior regional director for Ducks Unlimited, regularly hunts beaver ponds for wood ducks in the October season. In fact, there are few places he'd rather be than along the edge of a flooded forest as the first hint of daylight penetrates the early-fall foliage.

"There has been an explosion in the number of beaver ponds over the last 10 years or so, and the number of wood ducks seems to have increased, also," he said. "I'd almost say that there are too many beaver ponds now. The ducks seem to have too many places to go."

That's a good problem to have, added Manley. Wood ducks are sensitive creatures that respond quickly to changes in their surroundings. Too much of a good thing is never a problem, especially when you are talking about quality habitat.

Typical beaver ponds are relatively small, so hunters don't have to fret about setting up on the wrong end of the water. They do need to scout prior to the season just to make sure the birds are using that particular area, though. With an overabundance of quality habitat, wood ducks have the luxury of choosing the best beaver ponds over marginal ones.

"It's been my experience that newer beaver ponds tend to have more woodies on them than older ones. They tend to offer more overhead cover, which is important to wood ducks, also," said Manley. "There are some that I've been hunting for years that stay good for some reason, though."

Luszcz agreed. He figures the freshly flooded forest floor opens up a new food source by exposing bugs, seeds and vegetation that would otherwise be out of a wood duck's reach. They will walk on land to feed, but like any ducks, woodies feel much more comfortable if their feet are wet.

Manley typically throws out a small spread of decoys—no more than five or six—and hunkers down in some brush along the water's edge. He's become convinced that decoys really don't draw the ducks, they simply give those woodies that are already coming in an added amount of confidence that the pond is safe. Wood ducks rarely travel in large groups, so more than a half-dozen decoys is simply overkill.

"If the ducks are using that particular beaver pond, they will come in to it, decoys or not. There's something about using some decoys that just adds to the hunt, though," he said. "It's really just a matter of being in the right place at the right time."

One trick that Manley suggested is to add a little motion to your decoys. Either tie a string to one or two of them to give them some life, or simply wiggle your foot in the water to make ripples. Ducks rarely sit motionless, and wood ducks that have been shot at once or twice might flare from a lifeless decoy spread.

FLOAT HUNTING

Another great way to collect a limit of wood ducks is to hop in a canoe and ease down a river, jump-shooting the birds as they flush from logjams and pockets of quiet water along the shore. It may seem like easy hunting, but it's not. In fact, sneaking up on a flock of these wary ducks is downright difficult.

Mike Hillegass, Ducks Unlimited's central North Carolina regional director, looks forward to an October float hunt with his 18-year-old son, Gabe. The two avid waterfowlers spend as much time float hunting the tributaries of the Cape Fear River as they can, particularly during the early season, when resident woodies are abundant and hunting pressure hasn't made the ducks spooky.

"There are so many good rivers that are perfect for jump shooting wood ducks in the early season," said Hillegass, who lives in Harnett County. "We always manage to jump a pretty good number of birds, and we usually get a few."

F. EUGENE HESTER

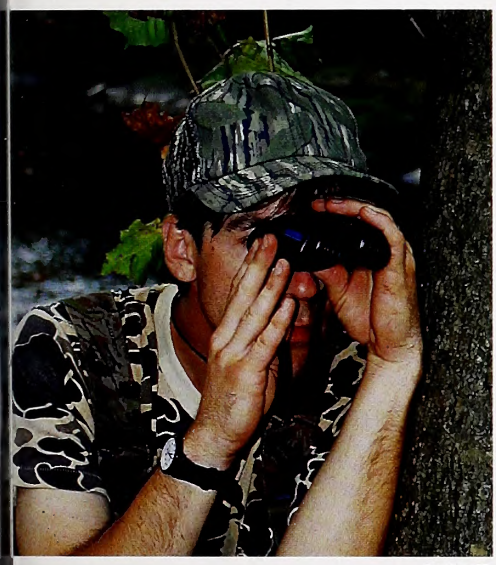
***Floating a river is** one popular method for finding woodies. With good camouflage and a slow, steady paddle, hunters can get within remarkably close range of these wary creatures. Some hunters prefer to stalk riverbanks using binoculars (facing page).*

His tactics are pretty simple, but he said the best waters are generally smaller rivers with lots of twists and turns, combined with a fair number of logjams and fallen trees. Ducks like bends in the river because debris collects there, offering a place free of the current. Those bends allow Hillegass to ease up on ducks that otherwise would see his canoe on a straight stretch of river.

Ideally, the river should be flowing at what he describes as a moderate to slow speed. That way, he simply has to keep the bow pointed downriver, a simple task in a gentle current.

"I've gotten to the point that I'm just as happy to be out on the river floating as I am if I'm shooting, so I like to put my son up front," he said. "That gives him the first chance to get some shooting."

Under no circumstances will Hillegass allow the person in the back of the canoe to shoot, unless they have stopped in shallow



DAVID HART

water. It's not only dangerous, it's also a good way to tip an already unstable canoe and lose some expensive equipment.

Johnboats will work on larger rivers, but canoes are generally a better choice for this type of hunting. They have a lower profile, and watercraft constructed of plastic-based materials are quieter than aluminum boats. Hillegass uses a 16-foot Old Town canoe that is olive drab inside and out. Although the dull colors help it blend in, he's not sure if it really matters that much. In other words, use what's available.

"I think the most important thing is to stay down low and sit still. Just try to look like a log floating down the river and you'll probably get within range of a few ducks," he added. "I try not to paddle if we are coming up to an area that might hold some ducks. I just let the current carry us down the river."

Surprisingly, the 46-year-old duck hunter has never run across another float hunter on his October outings. Public access is plentiful on the rivers he favors, but for some reason, few waterfowl hunters take advantage of the abundance of wood ducks and the mild weather.

"The thing I like most about a float hunt is that you never know what you are going to see along the way. We see hawks and owls, and one time we watched a family of otters slide down the riverbank and into the water," he recalled. "Getting a few ducks is an added bonus to seeing those things."

JUMP SHOOTING

Sometimes, the ducks just aren't flying. You could sit over the hottest beaver pond in the county and never have a woody give it a second look if they are already parked on a river or pond somewhere. That's when it's time to pick up a shotgun and go to the birds. If you have permission to hunt the high ground along a narrow river, jump-shooting is an exciting way to bag a few woodies. This is a great method for hunters who can't find a partner, or who simply like the solitude of hunting alone.

One of my favorite still-hunting tactics involves a spot-and-stalk approach. For this type of hunting, a pair of lightweight, quality binoculars is vital. Without them, you'll have to rely on good luck to sneak up on a band of woodies loafing on a logjam.

Waders are also a good idea unless it's warm, the water is shallow and you don't mind getting wet. Of course, those who have a well-trained retriever don't need to worry about getting birds that will undoubtedly fall in the water.

The best way to sneak up on a flock of wood ducks is to get a firm mark on their location before you plan a stalk. That's where the binoculars come in handy. I typically ease up to the water's edge and scan the river as far up and down as I can see. The binoculars help me pick apart every bump, ripple and dark spot in and around logjams and fallen trees. Often, they turn into ducks.

After I spot a flock of woodies, I make a mental note of their location and then plan a stalk that will take me right to them. More often than not, the plan works.

F. EUGENE HESTER

Where are the Woodies?

In addition to the numerous rivers and ponds throughout the central and western portions of the state, there are certain public duck hunting spots that also offer quality wood duck hunting. Supervising Wildlife Biologist Harlan Hall, with the N.C. Wildlife Resources Commission, said the Jordan Lake impoundments in Chatham County and Falls Lake in Wake County offer some of the best opportunities. Wood ducks can also be found at Harris Lake, located in Wake and Harnett counties. "The upper, shallow parts of Shearon Harris Lake are very popular to duck hunters," Harlan said. "Wood ducks can be found there as well as other ducks." For directions to these locations, contact the Wildlife Commission's Division of Wildlife Management at (919) 733-7291.

Another sure-fire method, particularly if you can round up a second hunter, involves flushing the ducks to your partner hiding along the river's edge.

Typically, my partner or I will walk right up the middle of a shallow, tree-lined river channel, while the other person hides 200 or 300 yards upriver. On smaller rivers, a group of jumped woodies tends to stay within the tunnel of overhanging trees and rarely leaves the safety of familiar territory. This type of hunting generally involves pass-shooting, but if you throw a few decoys out in front of you, those flushed ducks just might settle in to the fake birds.

When it comes down to it, good duck hunting is where you find it. If you don't want to drive to the big marshes of eastern North Carolina, search for a beaver pond or small tree-lined river close to home. If you can find that, odds are you've found good duck hunting. ⊠

fall on the Water

Autumn can be a spectacular season for canoeing or kayaking. Take time out for some paddling action this fall on these four memorable waters.

written by John Manuel ©2000

PATRICK N. GROFT

One of these mornings, you'll wake to the sound of calling crows. You'll step outside, feel a nip in the air and realize that the milky white summer sky has turned cerulean blue. Your blood stirs with the call of adventure, and you mentally tick off the usual outlets—fishing, football, hunting or hiking. All good ones, but this fall, how about something really different? Why not explore our waterways in a canoe or kayak?

Fall isn't usually a season that Tar Heels associate with paddling sports. The water is low, and most of our streams have been reduced to rocks and riffles. Even the big rivers are low and slow. But there are a few choice locations from the coast to the mountains where the water runs deep and where you can see the brilliant hues of fall reflected on a watery canvas.

These four big waters will indulge your paddling fancy.

***Gliding over still** water, this canoer approaches the marshes off Bear Island. Canoes and kayaks are the preferred way to make quiet discoveries.*

new river

Without question, the most popular fall canoeing destination in North Carolina is the New River, specifically the South Fork of the New River in Ashe and Alleghany counties. Designated as a National Wild and Scenic River in 1976, the New is unique among southeastern rivers for its remoteness and beauty. The water is clear and clean, propelled by a gentle slope and aerated every mile or so by small shale ledges. Following a serpentine course on its northward journey, the New provides the canoeist constantly changing views from all angles.

A trip down the New is a journey back in time through an area largely unchanged since the turn of the century. Cattle farms grace the rolling hillsides, interspersed with stands of hardwood and pine. The river is free of dams, parallel roads and the more offensive forms of development. Picturesque at any time of year, this landscape takes on a particular beauty in fall.

The color show on the New starts right at the banks. Swamp dogwoods, a common streamside shrub, turn a dusty shade of red in late September. Goldenrods, wingstem, sunflowers and coneflowers add a dash of green and yellow. When the first frost hits, the maples and oaks that line the banks and hillsides turn vibrant shades of crimson and maroon.

One of the high points of a fall canoe trip down the South Fork of the New is a view of 4,683-foot-tall Mount Jefferson. Visible on the north side of the river, the upper reaches of this peak turn a brilliant orange around the first week in October, with the color sweeping down the mountain's flanks for several weeks thereafter.

A fall canoe trip can be combined with a visit to various land-based events and attractions—the New River Festival in Todd, the nationally famous frescoes in Holy Trinity Church in Glendale Springs—to make a weekend worth remembering.

***Autumn on the** New River is cool and colorful, either for fishing—smallmouth bass is a favorite (bottom)—or for lazy paddling. Though some river stretches are gradually being developed, most of the river is unchanged (below).*

KEN TAYLOR

lake jocassee

North Carolina is not known for the beauty of its lakes, but one lake, actually a man-made reservoir, has to be seen to be believed. Lake Jocassee was constructed by Duke Power Company (now Duke Energy) in the early 1970s to provide hydroelectric power and cooling water for its Oconee nuclear power station. Straddling the North Carolina/South Carolina border at the edge of the Blue Ridge Escarpment, Jocassee has the look and feel of a little Switzerland. The lake is fed by a host of pristine mountain rivers including the Toxaway, Horsepasture, Whitewater, Thompson and Bearcamp, all part of North Carolina's brand new Gorges State Park. In places, waterfalls tumble straight into the lake from heights of more than a dozen feet. The lake has an azure blue tint that is reminiscent of the Bahamas. And when fall hits the surrounding landscape, the color combination boggles the imagination.

With its tailwaters in the Piedmont and headwaters in the Mountains, Jocassee supports a remarkable variety of vegetation along its rocky shoreline. Black gum and red maple mingle with hemlock and white pine. A

RODNEY FOUSHEE

snapshot of any one location may reveal sourwood, dogwood, red oak, poplar and beech. All of this translates into a potpourri of fall colors that appear as early as September and run for a solid month and a half. Peak colors typically occur around the first week in November, several weeks later than in the northern mountains.

Along with magnificent colors, fall brings a wide variety of waterfowl to Lake Jocassee. Loons, mergansers, wood duck, teal and widgeons all pass through on their migration from the North. Deer, turkeys, beavers and otters are frequently seen along the lakeshore. Jeff Diller, assistant superintendent at Devil's Fork State Park (S.C.), says it's not uncommon to see black bears swimming across the lake. Jocassee is famous for its monster rainbow and brown trout, which frequently exceed 10 pounds. These fish tend to lie in deep water —50 feet or more—during warm weather, but when the lake water "turns over" in fall, the fish come to the surface, where they can be caught on standard fly- and spin-casting gear.

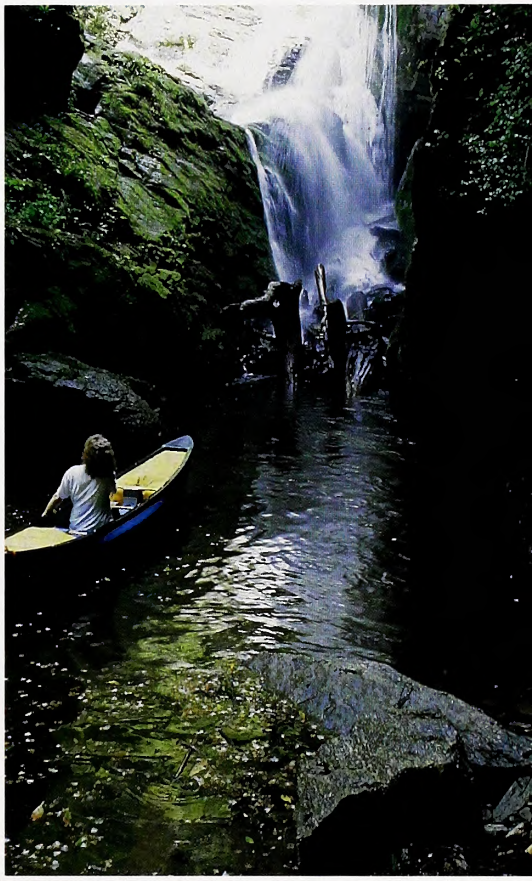
As with most reservoirs in the Carolinas, Jocassee can be overrun by motor boats and jet skis during the warmer months of summer. But after the Labor Day weekend, the waters cool and the power boaters head home, leaving the reservoir to the enterprising paddler. Jocassee is deep and wide in its lower reaches, so paddling must be pursued with caution. Sea kayaks may be the preferred craft, especially on windy days.

The only boat access to Lake Jocassee is from the Devil's Fork State Park in Oconee County, S.C. From there, it's a 2-mile open-water crossing into either of two relatively narrow arms. Primitive camping is available at the juncture of these two arms in campsites maintained by South Carolina State Parks. More adventurous boaters will want to travel up the arms to their convergence with the various feeder streams in North Carolina.

The eastern arm of Lake Jocassee runs a distance of 9 miles where it meets the Horsepasture and Toxaway rivers. Tucked in wooded coves along the length of this arm are three waterfalls that tumble directly into the lake from the surrounding gorges. These photogenic waterfalls provide an ideal habitat for moisture-loving ferns, mosses and the rare and beautiful Oconee bells, a flowering plant with galax-shaped leaves found only in two counties of North Carolina and in Georgia.

Approximately 7 miles up the eastern arm, the lake forks again along the submerged channels of the Horsepasture and Toxaway rivers. The right fork crosses into North Carolina and ends in a wide, sandy cove where the Toxaway rushes out of the forest atop a smooth expanse of bedrock. Spanning the river is a formidable wooden suspension bridge that carries the Foothills Trail. This trail runs for 80 miles along the Blue Ridge Escarpment through the Nantahala and Sumter national forests and can provide a wonderful side trip for canoeists spending several days on the lake. Primitive camping is available in a beautiful grove of hemlocks tucked between the lakeshore and the trail at the head of the Toxaway arm. Boaters must be prepared to bring everything needed for an overnight stay and remove it when they leave.

LAWRENCE S. EARLEY



JOHN MANUEL

***Straddling the** North Carolina-South Carolina line, Lake Jocassee provides big water for power boating, but paddlers can push up secluded coves (top) to explore boisterous and boulder-strewn whitewater feeder streams (above).*

merchant's millpond

When fall arrives, most Tar Heels head to the mountains, where they assume the colors are the most dramatic. However, some of the best late-fall colors—mid-October through mid-November—are more likely to be found in the coastal region, and particularly in the swamps. Merchants Millpond, a 1,900-acre swamp and state park in Gates County, is worth a visit any time of year, but none is better than late fall.

As its name implies, Merchants Millpond is a man-made body of water, created in 1811 by the damming of Bennetts Creek to power a gristmill and sawmill. However, the pond has been in existence for so long that it bears all the trappings of a natural swamp. When A.B. Coleman, an adventurer and developer, "discovered" the millpond in 1958, he declared

JOHN MANUEL

PATRICK N. GROFT

***Lovely at any time** of year, Merchant's Millpond is especially fetching in the fall when bald cypress trees make a magical transformation (top). A quick eye can catch a plenitude of reptiles and amphibians sunning amid the tannin-stained swamp waters dotted with cypress knees (bottom).*

it "the perfect swamp," prettier than the Everglades and more compact than the Okefenokee. Coleman purchased the millpond in 1968, then gave it to the state in 1974 to ensure that it would be preserved in perpetuity.

A brochure published by the N.C. Division of Parks and Recreation states, "It would take weeks in the Okefenokee [Swamp] to see what you can see in Merchants Millpond in a few hours." Though that may be a bit of an overstatement, it is true that one is immediately immersed in a classic swamp environment within minutes of leaving the state park boat ramp. Bald cypress and tupelo trees rise like ghosts from the tannin-stained waters, their branches draped with Spanish moss. Turtles and water moccasins hunker on logs, and woodpeckers cry out from the treetops. In summer, the heat and mosquitoes can make the swamp oppressive, but with the first killing frost, the bugs disappear and the colors emerge.

The fall mosaic at Merchants Millpond includes a striking blend of bronze, crimson and green. In the savanna-like expanse of the millpond, bald cypress needles shine like burnished copper in the low autumn light. Scattered among the living giants are dozens of ancient cypress stumps that serve as "planters" for a host of other trees and shrubs—red maple, swamp rose, royal ferns, wax myrtle—whose fall wardrobe runs the gamut from dark green to fire engine red. All these colors are mirrored in the still, black waters of the swamp. In the shallower reaches, they are offset by electric green mats of water meal, duckweed and pennywort. On an overcast day or in the subdued light of a misty morning, the saturated colors are a photographer's dream.

Canoeists can spend hours exploring the millpond proper, or they can venture up Bennetts Creek to the enchanted reaches of Lassiter Swamp. Lassiter contains some of the largest cypress trees in the state (up to 8 feet in diameter and 117 feet tall), and *the* largest tupelo. Quiet paddlers are likely to see deer, wood ducks and, in the twilight hours, gray foxes and raccoons.

bear island

Fishermen know the North Carolina coast is the place to be in the fall, but not many people think of it as a destination for paddle sports. From the standpoint of comfort and beauty, fall is the best time of year to visit the barrier islands, and a

great way to access them is by canoe or kayak.

There are countless nooks and crannies one can explore by boat along the coast, but the ideal spot for a fall paddling trip is Bear Island, located 2½ miles off the main land near the town of Swansboro. Bear Island has been preserved in an undeveloped state as part of Hammocks Beach State Park, which includes nearby Huggins Island and a headquarters on the mainland. Unfettered by beach houses or boardwalks, Bear Island's sand-duned backbone looms like a miniature mountain range above the sound. On the ocean side, a wide beach slopes gently to the water. Fourteen campsites nestle in and amongst the dunes, marked by nothing more than a signpost. While day trips are well worth the hour-long paddle from the mainland, an overnight stay is recommended for a truly soul-transforming experience.

From Memorial Day through Labor Day, a ferry makes regular runs out to the island from state park headquarters off Hammocks Beach Road. However, it is far more rewarding to reach the island by kayak or canoe, winding through the protected marsh between the mainland and the island. Besides the spartina grass, which turns a golden hue in fall, much of the vegetation, including live oaks and assorted shrubs on higher elevations, does not change color with the seasons. But fall floods the area with waterfowl, along with the customary assortment of wading birds and marine animals.

"Fall is probably the best time to see bottle-nosed dolphins in these estuaries," says Lamar Hudgens, owner of Barrier Island Kayaks in Swansboro. "We have some that will come within yards of the boats. When they exhale, you can even smell their breath."

Hudgens says fall is also the best time to camp on Bear Island, as the mosquito population is reduced, and the daytime temperatures are mild. Water temperatures remain in the 70s through October, so swimming or wading is still possible in the tidal pools, if not in the ocean. ⊠

Durham writer John Manuel is working on a book about paddling.

TIM REESE

***A hazy sun hangs** in an autumn sky as a kayaking tandem takes to the water near Bear Island.*

If you go...

New River: Except during periods of extreme drought, the South Fork is generally navigable from the N.C. 88 bridge in Ashe County downstream to the Virginia line. Five miles below N.C. 88 lies the Wagoner Road access to the New River State Park. Here, the state operates a concession area where boats can be rented and shuttles arranged. There are canoe-in campsites at Wagoner Road and at several points downstream, so it is possible to run an overnight trip on the New. Suggested one-day runs are from the Wagoner Road access to the U.S. 221 access (11 miles) and from the U.S. 221 access to the Alleghany County access (14.5 miles).

Lake Jocassee: Lake Jocassee is subject to periodic drawdowns by Duke Energy, and, for this reason, it is important to check with the power company or with Devil's Fork State Park at (864) 944-2639 about lake levels before setting off on a trip. Large drawdowns compromise the beauty of the shoreline and may make the upper arms inaccessible. Campsites in the park are available and also sites that are accessible by boat only. Lake maps are available for sale at Devil's Fork park.

Merchants Millpond: The principal access to Merchants Millpond is at the state park headquarters on Millpond Road just off of U.S. 158 east of Gatesville. Canoes are available for rent, and a small nature center will familiarize visitors with the area and the creatures one is likely to encounter.

Overnight camping is available on the millpond at a primitive campsite maintained by the park service. This is highly recommended for those wanting to experience the swamp in the magic light of evening. Contact park rangers at (252) 357-1191 to make a reservation, and to find out about boat rentals and water levels.

Bear Island: Permits for camping on Bear Island can be obtained on a first-come, first-served basis from Hammocks Beach State Park headquarters off of U.S. 24 near Swansboro, phone (910) 326-4881. A 2½-mile canoe trail has been marked out from the state park headquarters to the island. This and two other canoe trails to Bear Island have been mapped out by the Crystal Coast Outing Club under contract with the N.C. Division of Parks and Recreation. Kayaks are available for rent, and guided tours are offered by Barrier Island Kayaks, phone (252) 393-6457. In planning a trip to Bear Island or any other barrier island, it's important to check the tide tables for the easiest journey out and back. Either of the above sources can provide this information.

CECIL FROST

mountain forests: a wildlife DILEMMA part II

a case for management

To restore some declining wildlife populations in the mountains, forest management practices are needed to create the open habitats on which they rely.

written by Lawrence S. Earley

There was big news last spring when researchers reported finding 77,000 acres of old-growth forest in the Nantahala and Pisgah national forests. This was substantially more than anyone had expected to find and yet still a pitiful remnant of the original old-growth forests, so extensively were they logged in the early 20th century.

Two other statistics are worth contemplating: nearly 80 percent of the national forests' 1.01 million acres are more than 60 years old, but only about 5.4 percent of the forest is in the 1- to 15-year-old class, says Ed Brown, forest silviculturalist with the U.S. Forest Service in Asheville, and that number is likely to decrease. These early forest stages are critical habitat for many plant and wildlife species, and wildlife biologists fear that without increasing this habitat, known as early-successional habitat, many of these species will continue to decline (see "Disturbing News for Wildlife," September 2000 *Wildlife in North Carolina*).

Forest management practices that create and maintain early-successional habitats are often employed on national forest lands, but not often without some controversy. Indeed, there are many who wish to stop all forest management activities on North Carolina's national forests.

Little Hump Mountain in Avery County offers a good example of some of the dilemmas facing wildlife managers as they seek to increase habitat diversity in the mountains. Part of the Roan Mountain massif, Little Hump is one of about 43 mountain balds in the state, so-called because of their openness and lack of trees. It's also a type of early-successional habitat. Among 20 rare plants found in the grassland complex is the Gray's lily, which is threatened in North Carolina and a federal species of concern, and there is a variety of small mammal species—voles, shrews and weasels—that are adapted to this grassy area as well. Little Hump draws people, too, because of its spectacular views of Mt. Mitchell and Grandfather Mountain and colorful floral displays in the spring and fall. The Appalachian Trail cuts across the bald bringing hikers to some of the most scenic and open areas anywhere on the trail.

No one knows why Little Hump and the other mountain balds are so open, but ecologists agree that Little Hump is under siege. From all sides, masses of shrubs, especially blackberry and hawthorn bushes, are invading, shading out the open grasslands. Some balds in the Southern Appalachians have already been totally swallowed up by the woody invaders. Whatever the circumstances that kept Little Hump and scores of other balds open for centuries, all mountain balds will likely disappear sometime in the middle of the 21st century without some kind of management.

To keep the balds open on Roan Mountain, managers have employed a variety of management practices—mowing, burning, the use of herbicides and grazing by goats. On nearby Big Yellow

Once a fearsome sight, fire in some mountain forest communities may well be a key to their restoration. On a steep ledge on Shortoff Mountain in Burke County, U.S. Forest Service personnel set this prescribed fire to liberate a threatened plant species, the mountain golden heather (Hudsonia montana). The site was smothered in shrubs after 40 years of fire exclusion.

mountain forests: a wildlife DILEMMA part II

Mountain, The Nature Conservancy has allowed cattle grazing to maintain the open bald. Researchers suggest that grazing animals historically played an important role in maintaining many open habitats in the mountains. It's one reason why the U.S. Park Service will be reintroducing northern elk to the Great Smoky Mountains National Park early in 2001.

Deciding to restore Little Hump's open character was only one of several options that the U.S. Forest Service considered in 1991. Some preferred a hands-off alternative, deeming the invasion of woody shrubs an entirely natural process that should be allowed to run its course. When the Forest Service decided to manage Little Hump, it did so to preserve its scenic value to people and its habitat value to the plants and wildlife adapted to it.

The case of Little Hump bald sums up the uneasy choices facing conservationists over whether—and how—to manage our national forests in western North Carolina. In their study of mountain balds, Peter White, of the N.C. Botanical Garden in Chapel Hill, and Rob Sutter of the southeast office of The Nature Conservancy, aptly captured the dilemma: "Management of grassy balds raises two paradoxes in conservation," they wrote in 1999: "We seek to conserve a natural world that must change and we often interject human management into ecosystems that we would ideally like to see human free."

To wildlife biologists, it's not so much a paradox as an imperative: If we want to keep the species associated with early-successional habitats, we have to manage.

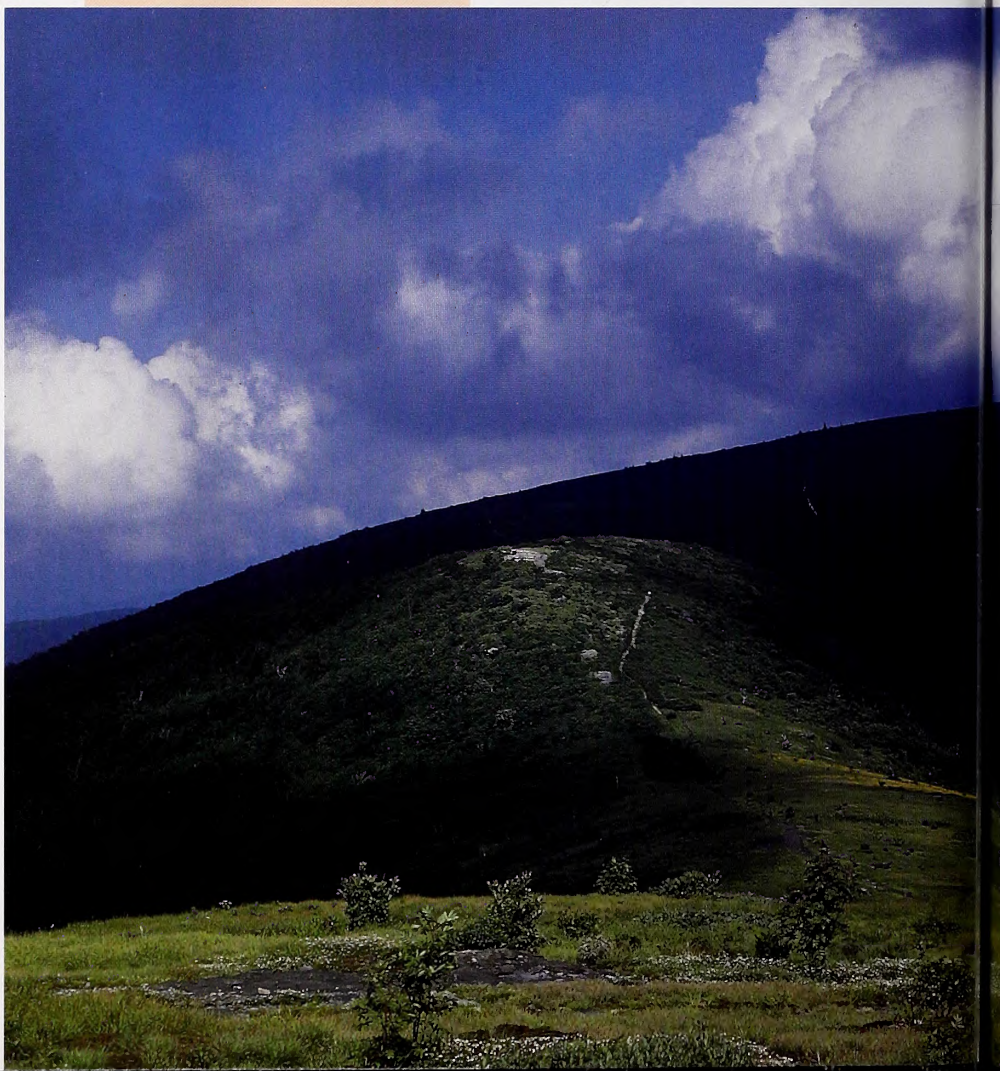
Fire in the Mountains

On the Wildlife Commission's Thurman Chatham Game Land in Wilkes County, managers are beginning to reintroduce fire to restore the table mountain and pitch pine forest community. Table mountain pine is so fire-dependent that only a hot fire will trigger the cones to release their seeds. Together with pitch pine, it grows on drier south- and west-facing ridges and slopes. It's an endemic Appalachian species, following the mountain chain as far north as Pennsylvania and into northeastern Georgia at elevations of 1,000 to 4,000 feet.

Though common in the Coastal Plain and the Piedmont, the use of prescribed fire to achieve management objectives is rather new in the mountains. Some areas in the pine lands of eastern North Carolina might have burned as often as every three years because of lightning ignitions, but in the mountains, where lightning-caused fires occurred less frequently, fewer acres burned. After Native Americans settled the Southern Appalachians about 12,000 years ago, however, fire became a more dominant force shaping the landscape. As the climate warmed and hardwood forests replaced the conifers, the people turned to fire to maintain some of the open habitats needed by their preferred food sources—mammoths, mastodons, deer, elk, bison—and plant foods (berries and ground nuts) that grew in and around these openings. One definitive study in the North Carolina mountains found that during the last 4,000 years, Native Americans using fire played an important role in determining the very composition of Southern Appalachian vegetation.

When Europeans entered the region, they too burned the hills to create and maintain pastureland for their cattle. But after cut-and-run loggers in the beginning of the 20th century created massive slash piles that caused catastrophic fires, the Forest Service fashioned a policy of total fire suppression, leaving many natural communities badly in need of fire today.

The south- and west-facing slopes of the Southern Blue Ridge Mountain contain one of them—the table mountain and pitch pine community. Normally, fire is thought to maintain this community in an open condition, but on Thurman Chatham fire suppression has encouraged shade-tolerant tree species and woody shrubs such as mountain laurel to shade out the pines. The result, as I found, is a dark and tangled forest, preventing light from reaching the ground and offering little or no pine reproduction.



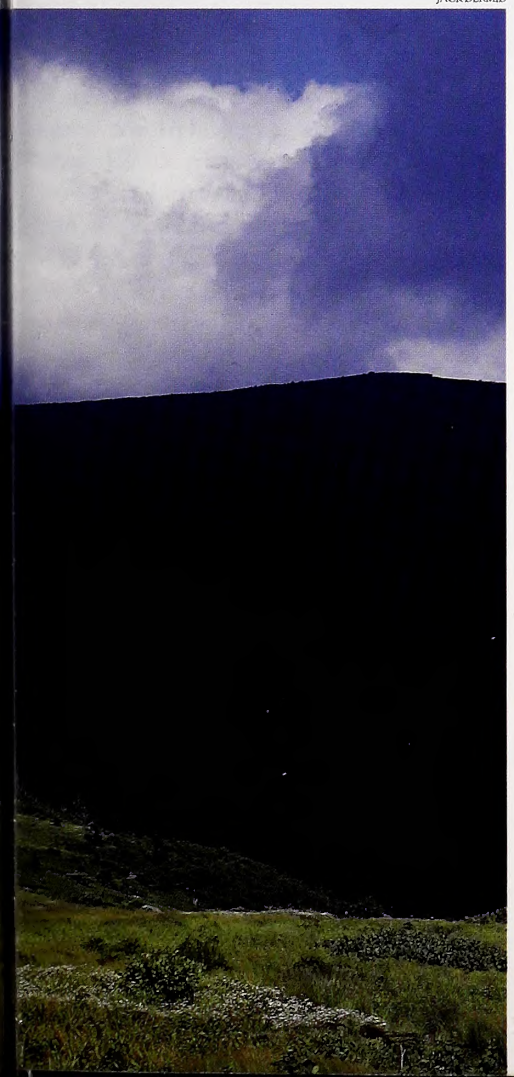
The openness of this mountain bald affords hikers on the Appalachian Trail spectacular views of surrounding mountains. But invading shrubs are threatening the open character of the balds and the habitat they provide to plants and animals. Managers are using a variety of means to maintain the open balds.

"We felt we were losing these sites," said Dean Simon, the Wildlife Commission forester for the western region. "They were here in the first place because fire at one time had established them, but because of fire suppression a thick laurel understory grew up. We've found that even light fires can control laurel thickets."

Simon showed me two table mountain pine sites that have been burned experimentally as part of an ongoing study by David Van Lear and graduate student Russell Randles of Clemson University. One site of 20 acres was burned for the first time last year, but it still had a ways to go. Heavy midstory vegetation blocked the light, and several inches of packed leaves and needle duff lay on top of the mineral soil. The table mountain pines would not be able to regenerate because the overhead canopy was still so thick. But with the first burn, progress had been made.

The second study site was a 7-acre experimental plot that had been prescribed burned four times since 1987. Across the road was a control site that had not been burned. The difference was striking. In the burned plot, fragile sticks of charred stems were all that remained of the mountain laurel, and the widely dispersed pine trees allowed ample sunlight to reach the ground, stimulating a vigorous herbaceous growth. In the unburned site a green jungle of laurel mantled the pines in darkness.

JACK DERMID



"And this was every bit as thick as this side of the road," noted Simon excitedly about the burned plot. "Look at what the burning has done—we've got grasses, bracken fern and vetch growing. The vetch is a legume, a nitrogen fixer. It puts nitrogen back in the soil. There's chinquapin, a shrub that produces nuts; Indian grass; blueberries!"

Simon is excited because this baseline study is providing data to confirm that there are wildlife benefits, as well as scenic benefits, that occur when fire is used as a management tool to create early successional habitat. It's an economical tool as well, far less costly than felling the laurel by hand.

"There is a place for prescribed burns in the mountains," he said. "Not in every place, of course. But where there are species that are dependent and are adapted to fire, it's an appropriate tool."

The Forest Service is experimenting with prescribed fire in other forest settings in the huge Nantahala and Pisgah national forests. Van Lear has had good success in burning midslope oak forests, finding that fire plays an important role in helping these stands regenerate. In Clay County, Forest Service botanist Gary Kauffman has applied prescribed fire experimentally and successfully in the Buck Creek Serpentine Barrens natural area. And in the past year, Wildlife Commission personnel have assisted in burning forest land in several national forest districts.

"The Forest Service has done more burning in the last year than in the 15 to 20 years that I've been here," says Joffrey Brooks, mountain area management biologist with the Wildlife Commission.

These are only beginnings. Prescribed fire is still controversial in the mountains, perhaps even more so since the catastrophic fires in Los Alamos, N.M., last spring. But its use as a management tool shows potential to restore natural communities and create excellent wildlife habitat in the mountains.

Good Forestry

As valuable a management tool as fire is, however, alone it can't produce the amount of early-successional habitat needed by wildlife in our national forests, at least from a practical standpoint. Silvicultural practices can efficiently restore and improve habitats

MELISSA McGAW

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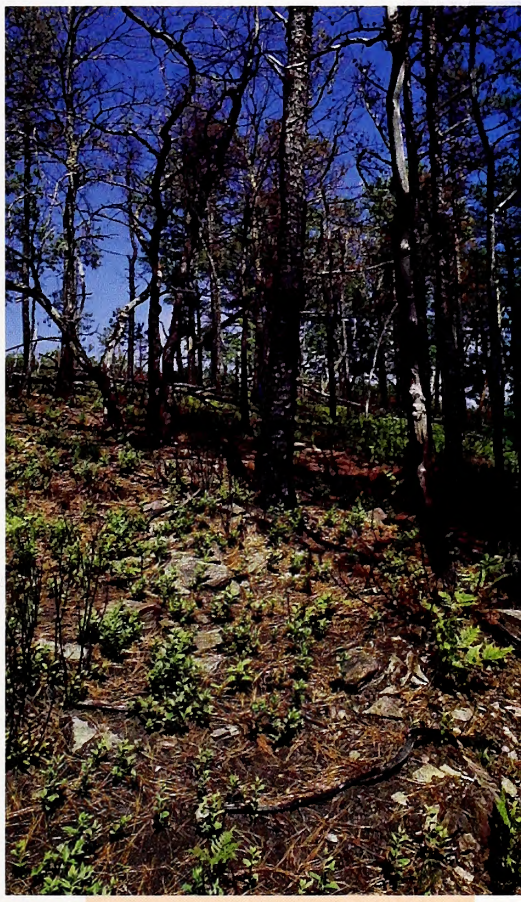


On Thurman Chatham Game Land in Wilkes County, a series of four prescribed fires has killed the mountain laurel that had invaded this table mountain and pitch pine community (above) after years of fire suppression. In the open and sunlit spaces, grasses, legumes and fruit- and nut-bearing shrubs flourish, providing food and shelter to wildlife such as the ruffed grouse (top) that use habitats like these.

mountain forests: a wildlife DILEMMA part II

and create habitat diversity. These practices usually involve some method of timber cutting to create the disturbed conditions that favor a host of species, including ruffed grouse, wild turkeys, prairie warblers and many other songbirds.

"Disturbed areas may not be pretty to look at right away, but they provide important habitats for certain wildlife and plant species, and so we can say there is some beauty in disturbance," notes supervising wildlife biologist Gordon Warburton.

Since 1925, forest researchers at Bent Creek Experimental Station in the Pisgah National Forest, near Asheville, have managed hundreds of experimental plots to demonstrate the effects of a number of silvicultural methods on forest growth, including clearcutting, shelterwood and selection. Of all of these methods, clearcutting probably has the most name recognition, although because of the notoriety of the method very little clearcutting is being done today on either the Pisgah or Nantahala national forests. There are important differences between the three:

- In a clearcut, foresters remove all or most of a stand's trees in a single harvest, creating an even-aged stand.
- In a shelterwood harvest, trees are removed gradually over time, also creating an even-age stand.
- Selection cutting involves removing either a single tree (single tree selection) or a small group of trees (group selection), leaving the small gap to seed in naturally. The result is an uneven-aged stand.

Each of these methods has its advantages and disadvantages, says Dave Loftis, research forester at Bent Creek. It all depends on the site and the conditions of the stand. "The purpose of silviculture is to create and maintain the kind of forest that meets the objectives of the owner, while assuring regeneration," he says.

In any of these harvest methods, the needs of wildlife can and should be integrated with the forest management objectives. This is what occupies Wildlife Commission biologists and foresters on private and public lands in the mountain region. Many Wildlife Commission recommendations have become standard practices in the management of national forests, as stated in the current land and resource management plan for the Pisgah and Nantahala national forests.

Before cutting even begins, for example, it is critical that rare or endangered and threatened species—plant and wildlife—and their habitats are identified and protected. It's equally important that significant old-growth stands are identified and retained in the landscape.

"We also identify den trees and snags—trees with cavities can provide critical den and nesting sites for wildlife," says Dean Simon. "In most cases, there's no reason why the logger needs to cut them because they have no timber value." Hard and soft mast are important wildlife foods, and biologists make sure that these food sources are provided. Where a forest will undergo a non-commercial thinning, biologists recommend keeping some soft-mast trees (cherry, persimmon and dogwood) and hard-mast trees (oak and hickory) along with den trees and snags.

"Many species of oak will continue to produce acorns well past 100 years of age," Simon says. "We recommend delaying harvest in mature oak stands so that wildlife can take advantage of the mast-bearing years."

In areas that have been regenerated, grapes provide a critical soft-mast food source. "In the mountains, grapes are the most important mast crop behind acorns," biologist Joffrey Brooks says. "Not only grouse eat the grapes, but turkeys, black bears and many other species. And it's a dependable crop, too, not like acorns which are produced irregularly."

Wildlife needs can also be met by keeping timber harvests relatively small, well dispersed across the landscape and irregularly shaped to provide a more natural edge shape. Longer rotations can maximize the number of mast-producing trees and den trees as well.

Another opportunity to improve wildlife habitat conditions in conjunction with timber harvests is to cut trees that are shading seeded roads and field edges. Called "daylighting," this work enhances vegetative growth on seeded roads, thus reducing erosion and runoff. It softens field edges by creating an ecotone or transition zone between the woods edge and the grass field, greatly enhancing this edge for wildlife.

Biologists discourage timber harvesting along stream banks. The increased sunlight on the stream can raise the water temperature and ruin the habitat for cold-water fish and invertebrates. "There's a whole suite of wildlife species—minks, raccoons, salamanders, snakes, turtles, acadian flycatchers, Louisiana waterthrush—that are tied to riparian habitats," says Simon. "These areas function as wildlife travel corridors, and they provide important food sources, nesting habitat, as well as escape and roosting sites."

After harvesting is completed, good management practice includes seeding of skid trails, log landings and logging roads with native warm-season grasses, clovers, spicebush and other vegetation. These plantings can benefit wildlife, stabilize the soil and reduce erosion. Sites ought to be regenerated with the same species—hardwood sites should remain in hardwood and pine sites in pine. The conver-

"Disturbed areas may not be pretty to look at right away, but we know that they're doing a lot for wildlife and plants, and so we can say there is some beauty in disturbance."

—Gordon Warburton, N.C. Wildlife Resources Commission wildlife biologist

MELISSA McGAW

KEN TAYLOR

sion of hardwoods to fast-growing pines has been a major problem, especially on private lands. "We've practically eliminated the conversion of sites on national forest land," says Simon. "That's not occurring any more and it's been very positive for wildlife."

Where Buffalo Roamed

It's hard for some to imagine the mountains except in the way they appear today, clothed in dense forest greenery, a forest slowly moving toward maturity. Three quarters of a century ago, these mountain vistas were nearly completely deforested, but before that, a different forest existed. It was older than today's, for sure, and yet younger too, a forest with grassy gaps maintained by fire and grazed by buffalo and elk.

Trying to restore these early-successional components to our mountain forests is risky and uncertain, but deciding not to do anything may be as risky. In the case of mountain balds, the consequence of doing nothing will be to watch the balds disappear. In the case of fire-suppressed forests, the consequence of shying away from prescribed fire is to lose the full functioning of several natural communities, and the plants and animals that are adapted to them. And in the case of the middle-aged forests that now make up the majority of our public lands, the consequence of aging forests may be a continued decline in golden-winged warblers, as well as many other rare species.

"It's a choice you have to make," adds Chuck Hunter, nongame bird coordinator with the U.S. Fish and Wildlife Service. "Either you do nothing because you're afraid forest managers will go too far, and you accept the continued declines we'll see in wildlife, or you take a chance that we can actually do it right and learn as we go." ⊠

MELISSA McGAW

KEN TAYLOR

Forest managers use timber-cutting practices to create badly needed early-successional habitat. This small clearcut (top) has irregular edges. A shelterwood cut (above, right) provides open habitat while leaving trees to seed in the site. Small cuts (above, left) may be sufficient to provide for wildlife needs.

BRIDGE Stripers

Hankering for some exciting coastal striper fishing this fall? Look no farther than the nearest set of bridge pilings.

written and photographed by Joel Arrington ©2000

Capt. Bryan DeHart holds a rod in both hands as he stands in rapt concentration with his knees against the gunwale. Twenty feet below near the bridge fender, a live eel hooked through the lips is held to the bottom by a 1-ounce slip-sinker in a moderate tide.

"I can feel it mouthing the bait," the Manteo guide whispers to his client in the stern. "There," he says suddenly and lifts the rod sharply, setting the hook. On the initial run, the tip goes nearly to the surface as he plays the fish carefully between the fender and the pilings. With the drag giving line smoothly when DeHart loosens his thumb on the spool, the striper puts up a good fight before the guide is able to lift it into the boat.

"It'll go 28 to 29 inches," DeHart says as he holds the fish a few seconds for photos, "6, 6½ pounds." Then he releases the striper into the dark waters of Croatan Sound, and we resume fishing.

This scenario has been duplicated countless times in the past several years. Anglers in

the northeastern corner of the state are enjoying an abundance of striped bass, thanks to effective management and a long period of restricted harvest. Not only are migratory populations from the Chesapeake Bay and points north plentiful in the ocean off North Carolina where they winter, but the native Albemarle Sound/Roanoke River stock of striped bass has developed into a large, if still young, population. In addition, stripers remain plentiful in the mouth of the Neuse River near New Bern.

Striped bass tend to hold close to structure at times. And the most abundant and easiest-to-locate structure in the northeastern sounds is provided by bridge footings. So from Oregon Inlet to Edenton and south to New Bern, expert anglers and professional guides are fishing with great success under every major bridge.

They have devised and honed specialized methods of trolling and casting with spin, conventional and fly tackle. Anglers may use live or cut bait, or they may use artificial lures. Conditions change constantly, so techniques must be modified accordingly. An angler may choose to fish for the small stripers that are so abundant or for larger specimens which, so far, remain fairly rare.

Striped bass not long ago were abundant enough in Croatan Sound to support a fleet of charter boats at Manns Harbor. From fall until Christmas in the '60s and early '70s, local watermen took customers out to troll heavy jigs on spreader rigs along the bridge pilings and in the open waters of the sound.

One windy day with all the boats tied up, I wandered along the rickety dock and noticed one of the skippers in his locally built sportfisherman. I stepped aboard and we fell into conversation about weather and fishing. The old salt kept his supply of jigs stuck into the wooden walls of the salon, making a colorful frieze. I asked him if I could take a couple down for a closer look and he gave me instead a bit of advice for life: "You do whatever you want to," he said, "or come as close to it as you can."

***Though almost any** bridge crossing a sound in North Carolina can produce stripers, one of the most reliable—as Capt. Bryan DeHart demonstrates (right)—is U.S. 64 across Croatan Sound at Manns Harbor. Other good bets are N.C. 12 across Oregon Inlet, U.S. 158 across Currituck Sound and U.S. 17 across the Chowan River.*

Capt. Brian Horsley of Kill Devil Hills, an ardent angler who is coming close to doing just what he wants with his life, guides mostly fly-fishermen in the northeast corner of the state much of the year. To get flies down deep beside bridge pilings, "where you need to be" for stripers, he says, he recommends 1- to 2-foot leaders on a 30-foot sink-tip line of about 350 grains. He likes the Whistler flies designed by West Coast expert Dan Blanton to imitate a bucktail jig. For bridge fishing, Horsley prefers bead-chain eyes to the lead eyes on the typical Clouser Minnow, another pattern useful for fishing deep and one that has become increasingly popular in coastal waters.

"No matter how many times you slap a piling with bead-chain eyes," he said, "they will not break off. The downside, of course, is they don't sink as well."

DeHart ties a pattern that combines elements of the Clouser with those of the popular Lefty's Deceiver. He calls it a "Clouceiver" but notes that the pattern is also known as a "Half and Half."

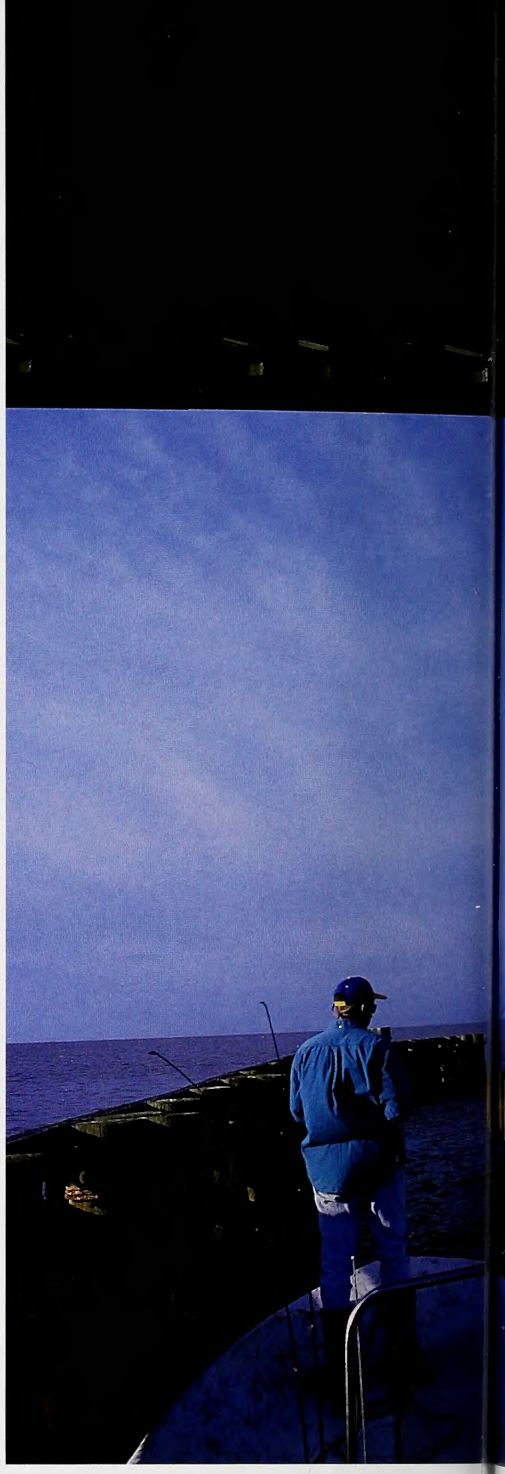
"It's a Clouser with feathers tied in," he said.

DeHart likes the pattern in white, white and chartreuse, and chartreuse and red, all tied on 2/0 hooks.

He says the more active fish may be holding close to bridge pilings, but that it's often productive to back off and cast away from the pilings and let the line take the fly to the bottom for the less active, and often larger, fish. He prefers not to anchor, but acknowledges that fishing from an anchored boat can be productive. "I like to cover more water," he said.

Fishing the uptide side, DeHart may work along the bridge until he finds aggressive fish. There he might go up current and anchor, he said, at least for as long as the fish continue biting.

It's unproductive to fish a sinking fly line uptide until the current is nearly slack, because the line washes back to the angler before it sinks sufficiently. DeHart recommends an uptide position on the pilings, casting and



perhaps feeding out line as it sinks.

The worse the conditions, most anglers agree, the better striped bass bite. When conditions are rough at Manns Harbor, and with a heavy tide running, Horsley recommends anglers move to the east side of the sound into the shallows.

"There's less tide and plenty of fish," he said, "and there you're in the lee on a northeaster."

Capt. George Beckwith of Oriental, another skiff guide with much experience on striped bass, likes to fish the wooden rather than concrete pilings. Normally most of the wood is found along the channel

where it passes under the bridge, he said.

"I don't know if it's because there's something growing on it," Beckwith said, "but I usually find more fish on the wood."

He fishes a topwater lure to locate the more active fish but points out that stripers will suspend a few feet below the surface even if the water is quite deep.

"If they're just slapping at a topwater plug and not really taking it, I've found I can change to a jerk bait, such as a Rapala or Rebel, and get solid, aggressive strikes."

Beckwith also fishes a lipless crankbait, such as a Rat-L-Trap, a design that sinks. He said he fishes one like a jig, letting it fall, then repeatedly jerking it up from the bottom, imparting a yo-yo action.

For conventional casting, DeHart likes three lure types. One is a 1-ounce lipless crankbait. His favorite is the Cordell Super Spot in a chrome finish with blue back. He removes the front set of treble hooks and bends the barbs down on the back set. That way, he says, he can grasp the lure in a fish's mouth without fear of getting hooked and, with pliers, remove the back set without bringing the striper into the boat.

"That minimizes stress on the fish if you're catch-and-release fishing," he said.

Another favorite for stripers is a bucktail weighing from 1/2 to 1 ounce for most conditions. DeHart likes white, chartreuse or yellow jigs tipped with straight worms or curly-tailed trailers, "according to the fish's preference that day."

His final choice is a 1/2- or 3/4-ounce jig head with a 4-inch plastic shad body. When fish are inactive and "light on the bites on larger bucktails," he said, "you can size down to some of the smaller soft plastic baits. I've caught non-aggressive stripers on shad bodies down to as small as 1 1/2 inches."

DeHart fishes light jigs on spin tackle and 6- to 12-pound-test line with a 2-foot shock leader of 20-pound test. He uses baitcasting tackle for larger lures.

Striped bass are a cool-water fish. And though they can be caught nearly year-round in North Carolina's sounds, the best fishing begins with the arrival of cool weather in October and can last into January.

Though artificials will take plenty of striped bass, live baits are usually better for catching larger stripers. DeHart may drift live finger mullet or small croakers back near bridge pilings on slip bobbers, fishing 2 to 3 feet off the bottom. He also drops live fish, including eels—the champion of striper baits—to the bottom with a Carolina rig, then takes three or four turns up off the bottom.

"The local tackle shops have made an effort to supply live eels the last few winters," DeHart said. "That has made a difference in the number of bigger fish we catch."

For most of the year, the striped bass fishery in Albemarle Sound and adjacent waters is largely catch-and-release. However, a harvest is allowed during the late fall (see "Striper Regulations"). In either case, anglers will likely have to release some fish, and conscientious anglers will try to maximize a released fish's chances of survival.

"You need to catch them quickly," DeHart said. "Don't bring them out of the water, and don't just drop them overboard. Often you've got to revive them. Be sure they can swim off rather than going belly-up near the boat."

As North Carolina's striped bass populations continue to expand, as anglers and managers hope they will, bridges will no doubt continue to be among the most productive fishing locations. Careful technique applied over time is sure to pay off in bigger fish and more releases. ⊠

Striper Regulations

Though you can catch stripers from nearly any bridge crossing in coastal North Carolina, **where** you catch the fish makes all the difference when it comes to whether you can keep them or not. There are three sets of distinct rules that apply to coastal striper fishing, which is regulated by the N.C. Division of Marine Fisheries.

1) A fall harvest season typically begins in late October and lasts through the end of the year in the Albemarle Sound Management Area, which includes Albemarle, Croatan, Currituck and Roanoke sounds and their tributaries (excluding the Roanoke River and its tributaries). However, this season had not been set at press time.

2) In the coastal waters outside the Albemarle Sound Management Area, the striped bass season is year-round with a daily limit of three fish per angler and a minimum length of 18 inches.

3) In the Atlantic Ocean including the waters east of the Oregon Inlet bridge, each angler can keep two striped bass with a minimum size of 28 inches.

**For more information on the latest striped bass seasons, contact the Division of Marine Fisheries at 1-800-682-2632 (web address: www.ncfisheries.net).*

GIFT *of a* LIFETIME

Wild Turkey Release

Nineteen years after its inception, the N.C. Wildlife Endowment Fund is hitting its monetary stride. It's giving sportsmen an opportunity to become shareholders in a creative investment strategy that helps wildlife.

written by Chris Powell

In a few months, we'll enter the year made famous by the science fiction movie *2001: A Space Odyssey*, and much discussion will undoubtedly turn to technology and the future of mankind. But it would be equally interesting to consider what's in store for wildlife and its management during the next century. Will wildlife populations maintain their current levels? Will there be enough land—public or private—to conduct sporting activities? Will the N.C. Wildlife Resources Commission continue to sell enough hunting and fishing licenses to fund the level of species management to which we have become accustomed?

Given North Carolina's rapid transformation from a rural to an urban landscape, each of these questions would suggest pessimistic answers. But for a moment, imagine a Wildlife Resources Commission that was totally self-supportive, never in need of fees from hunting and fishing licenses, revenues from the taxes on the sale of sporting goods, or allocations from the state's general fund. Imagine a North Carolina where millions of dollars worth of game lands could be purchased in a year without financial strain. Imagine a professional staff of wildlife conservationists triple or quadruple its present size, providing a level of species management never before seen. All of these dreams are very possible, due to a little-known program called the N.C. Wildlife Endowment Fund.

When future generations look back, they will likely attribute much of the condition of this state's wildlife to a single act initiated in 1981. The creation of the N.C. Wildlife Endowment Fund was and still is a state-of-the-art investment program with unlimited financial potential. In an era defined by instant results, the Endowment Fund is visionary in that its true power will benefit wildlife during a time none of us will see but all of us can be a part of.

Necessity being the mother of invention, creation of the endowment fund was an idea whose time had come. It was the late 1970s, and the state's smallest agency had been suffering through some lean years. Wildlife Commission vehicles had excessive mileage, boat engines needed replacing, uniforms were threadbare, the agency's communications system was outdated, and there was barely enough money to make the payroll, much less fund needed wildlife management projects.

The Wildlife Commission has a long history of being mainly self-supporting through license fees and taxes on hunting and fishing equipment, so it was understood that relief would not come from the state's general fund (where tax revenue is held). The money had to be found internally and from traditional funding sources.

Eddie Bridges, a former Wildlife Commissioner, can be credited with conceptualizing the Endowment Fund. Why not, he thought at the time, create a hunting and/or fishing license that would cover sportsmen for the rest of their lives? And why not put those special license fees into a fund from which only the accrued interest, never the principal, could be spent? Eureka!

An equal amount of credit must be given to the other members of the Wildlife Commission and its then chairman, Bob Gordon, who guided the proposal through the legislative process.

So well supported was the idea, in fact, that in 1981 the Wildlife Endowment Fund (also known as the Eddie Bridges Fund) passed both the N.C. House of Representatives and the N.C. Senate unanimously.

It was a simple yet revolutionary concept, a sort of 401(k) for wildlife. Money from the sale of lifetime licenses and lifetime subscriptions to *Wildlife in North Carolina* would be invested by the state treasurer in an interest-bearing account comprised of very secure long-term treasury bonds and corporate securities. And only the accumulated interest could ever be spent.

By applying business economics to public money, a win-win situation was created for everyone. Hunters and anglers could (and still can) purchase lifetime licenses and save money in the long run, while the Commission realizes a substantial financial gain. Here's how it works:

The cost of a $500 lifetime "sportsman" license is equivalent to about 12 annual "sportsman" licenses, which currently sell for $40. So, after 12 years, hunting and fishing privileges are essentially free for a lifetime license owner. However, that same lifetime license holder actually continues funding Wildlife Commission projects because his or her initial $500 remains invested. The interest earned from a $500 license equals or exceeds the revenue that would have been derived had the same hunter or angler purchased a yearly license for the rest of their lives. And the best part is that the money is invested in perpetuity, meaning lifetime license owners continue to fund North Carolina wildlife conservation if they leave the state—or the planet.

Children under the age of 1 are eligible for a $200 lifetime license, and those ages 1 through 11 qualify for a $350 lifetime license. Since children accompanied by properly licensed adults are not required to have hunting or fishing licenses until they are 16, the youth lifetime licenses generate the equivalent of 16 years worth of fees that otherwise wouldn't be available. If a $200 license is purchased for a one-year-old today, that investment will generate $431 in interest (assuming an average interest rate of 7 percent) by the time the child turns 16. When the same child turns 65, the initial $200 will have generated $16,054, according to the Wildlife Commission's financial management section.

Wayne W. Martin, 64, of Morganton, said he purchased a lifetime sportsman license for his grandson, Ian, because the gift would never hang up like a lost fishing lure or wear out like an old reel. "For this little kid," Martin said, "I wanted to give him something that

Bargains of a Lifetime

- A lifetime sportsman's license for people ages 12 and older costs $500 and covers all of the state's hunting and fishing license requirements. (It does not cover the federal waterfowl stamp.)
- An identical lifetime sportsman's license for children ages 1 to 11 is available for $350.
- The same lifetime sportsman's license costs just $200 for youngsters under the age of 1.
- A special sportsman's license is available for people ages 70 and older and covers all hunting and fishing requirements.
- A statewide comprehensive hunting license can be purchased for $250 and covers all hunting license requirements.
- A statewide comprehensive fishing license costs $250 and authorizes fishing in all public waters including designated mountain trout waters.
- ♿ Combination hunting/fishing licenses that cost $10 are available for veterans considered 50 percent disabled and for non-veterans considered totally disabled.
- ♿ A lifetime disabled sportsman's license is available for $100 and covers all hunting and fishing license requirements. It does not cover any special licensed activities.
- A lifetime subscription to ***Wildlife in North Carolina*** magazine is $100.

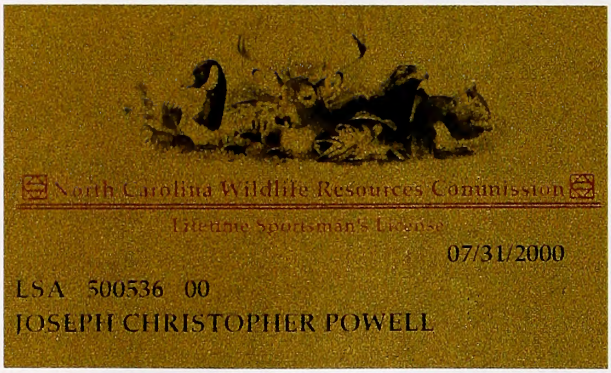
For more information, call the N.C. Wildlife Resources Commission at (919) 662-4370.

would last him for a lifetime and, at the same time, be of great benefit to wildlife."

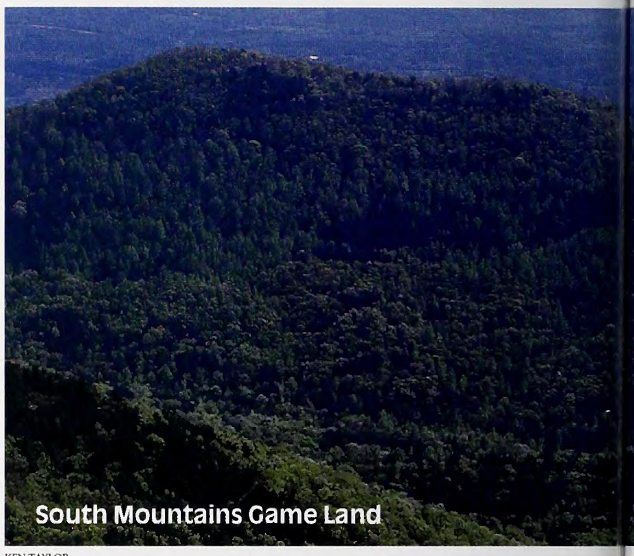
Warren S. Perry, 75, of Kinston, has purchased lifetime sportsman licenses for 11 of his grandsons and his wife, Barbara. "I hope my grandsons will enjoy hunting and fishing as much as their grandmother and I," Warren said. "And, of course, it's a good bargain, too."

Though most people buy these licenses for the privilege of taking game and fish for a lifetime, they also know that the purchase includes the opportunity to give back for an eternity.

Since the Endowment Fund's inception, more than 118,000 lifetime licenses have been purchased. Also, proceeds from the sale of nearly 8,000 lifetime subscriptions to *Wildlife in North Carolina*, as well as more than $224,000 in direct donations, have gone into the fund. All these have totaled approximately $30 million in principal that, in just 18 years, has accrued about $30 million in interest. The Wildlife Commission has spent more than $20 million in available interest on fish and wildlife conservation projects.



***With the purchase** of a lifetime sportsman's license (left), hunters and fishermen can be proud to count themselves among the select group of men and women who've made a lifelong commitment to wildlife.*


South Mountains Game Land

KEN TAYLOR

The amount of interest spent yearly is determined by a simple formula the Wildlife Commission adopted. Each year, an average of the previous three years' balances (principal plus interest) is calculated, and 5 percent of that mean amount can be spent. At present, the 5-percent average works out to about $1.8 million for projects considered critical. To stretch those funds, the Wildlife Commission routinely uses endowment monies to match federal aid grants. Sometimes these grants provide matches of three federal dollars to one state dollar.

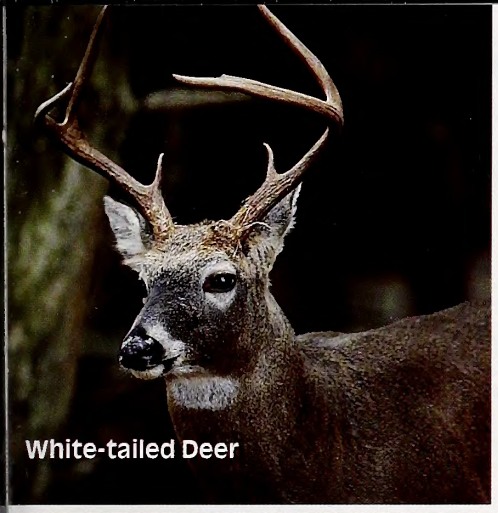
Even so, some people have suggested that the Wildlife Commission is being a little stingy with a fund that presently has $5.2 million in available interest to spend. But consider this: The endowment fund is earning close to one-quarter of a million dollars per month—more than $3 million per year. Start compounding those numbers, project them into the future, and it gets very interesting.

According to the Wildlife Commission's finance section, if lifetime licenses continue to be sold at the present level, in 50 years the Endowment Fund will be worth an estimated three-quarters of a billion dollars (using an average 7-percent interest rate and the before-mentioned expense formula). Just ponder what that figure could be in 100 years. Suffice it to say that the Endowment Fund could very well provide enough money for the Wildlife Commission to one day become completely self-sufficient.

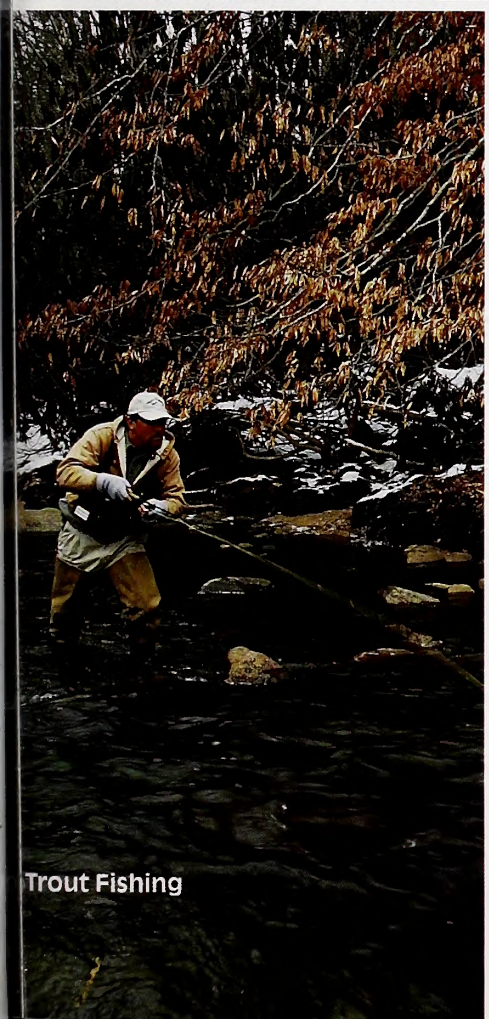
But don't think the Endowment Fund is only about the future. The program has gradually been making a larger impact since its inception in 1981. The commission was able to use about $900,000 of Endowment Fund money to overhaul its aging communications system and purchase new radios. Funds have also allowed wildlife officers to upgrade safety equipment essential to their welfare.

"This money has allowed us to update equipment that we might otherwise not have been able to," said Col. Roger LeQuire, head of the Enforcement Division. "We are able to do a better job protecting the fish and wildlife resources of North Carolina and serving the sportsmen, as a result."

Some people may wonder how wildlife enforcement expenditures could benefit sportsmen. The answer becomes clear immediately to anyone on a sinking boat or lost in the woods. Moreover, every day, wildlife officers enforce the laws and regulations that ensure the state's resources will be around next year for all to enjoy. Without the necessary equipment, the Enforcement Division would have a hard time deterring deer and



White-tailed Deer



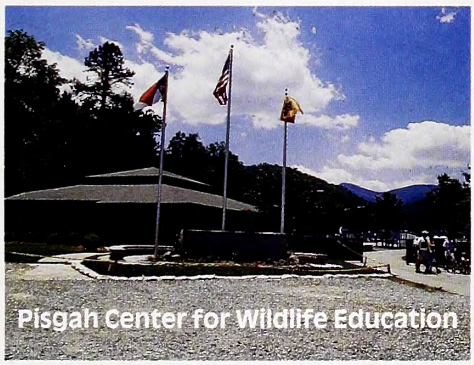
Trout Fishing

MELISSA McCAW

turkey poaching, overharvest of striped bass, bear baiting and countless other violations.

The Division of Conservation Education has used endowment funds for a variety of public education projects. Most recently $1.4 million went toward constructing the Pisgah Center for Wildlife Education, one of the best educational tools the Commission has ever produced. Last year, more than 80,000 people visited the Pisgah Center (located in Transylvania County), learning why conservation programs and the hunters and anglers who support them are so vital. To that same end, endowment funds help offset publishing costs for *Wildlife in North Carolina magazine*, which goes to 72,000 homes and businesses a month.

"We have also used the Endowment Fund to support our aquatic education resources programs such as Caring for Aquatics Through Conservation Habits (CATCH), which teaches children about aquatic resources and how to fish," said Sid Baynes, chief of the Division of Conservation Education. "In addition,



Pisgah Center for Wildlife Education

N.C. WILDLIFE RESOURCES COMMISSION

Endowment Fund moneys have been used for N.C. WILD, a program that instructs schoolteachers to use wildlife and ecological concepts to teach math, science and language arts."

Also bearing mention is the statewide computer network for license sales, which was implemented in 1997 with assistance from the endowment fund. By linking all license agents with the Raleigh headquarters, the network has made obtaining a license or boat registration a more convenient and cost-effective process.

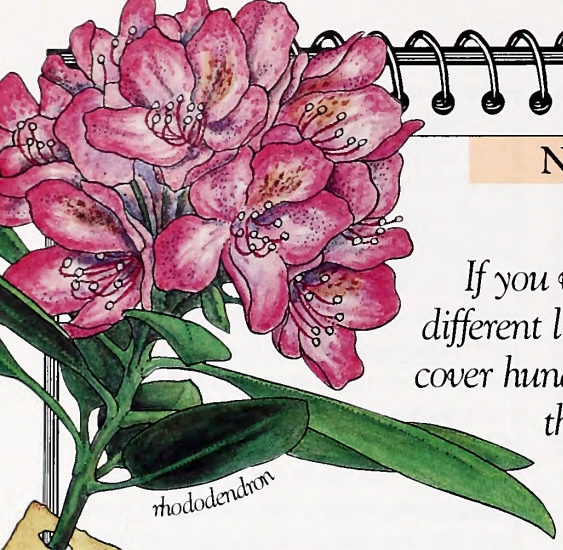
The Division of Wildlife Management and the Division of Inland Fisheries programs have probably benefited most from the Wildlife Endowment Fund. In 1998, $1.15 million was allocated to help purchase the 17,829-acre Rollins tract, which was added to the South Mountains Game Land, in Burke, Cleveland and Rutherford counties. In addition to numerous other game land purchases, Wildlife Management has used endowment moneys to expand the wild turkey restocking program and has matched funds with federal aid to upgrade tractors and other equipment used to enhance wildlife habitat. This machinery is used for game-management projects such as planting dove fields with sunflowers and building dikes for waterfowl impoundments. Nongame species are receiving dividends, too.

"We recently used Endowment Fund moneys to pay for controlled burning at the Sandhills Game Land to improve wildlife habitat in Moore, Richmond and Scotland counties," said Wib Owen, section manager for the Division of Wildlife Management. "Habitat improvements benefit all wildlife species, not just game animals."

Because of aging facilities, the commission's Division of Inland Fisheries has directed most of its endowment funds toward maintaining its fish hatcheries. During the past five years, a total of $1 million has funded the Cold Water Hatcheries Maintenance Project. It goes without saying that the viability of these hatcheries is crucial to ongoing fish-stocking programs.

"We recently received $700,000 to do hatchery repairs at the Armstrong Hatchery in McDowell County," said Bob Curry, program manager for the Division of Inland Fisheries. "A couple of years ago, we received about $450,000 to build depots in the Piedmont and Mountain regions, and we are now in the process of building a workshop and storage facility at the Balsam Depot in Waynesville."

These are just a few examples of how the Endowment Fund has played a part. By purchasing a lifetime license or magazine subscription, you can have a more far-reaching impact on wildlife conservation than you ever imagined. It's like owning stock, only your investment is guaranteed to pay off, and with something far more precious than money. Your lifetime purchase will forever work to ensure that outdoor sporting experiences remain available for your children and their children and on and on. That's a prediction you can take to the bank. ⊠


rhododendron

Rhododendron catawbiense
rhodo: red; *dendron*: a tree; *catawbiense*: from the Catawba (River)

blue jay

Cyanocitta cristata
cyan: dark blue; *citta*: jay; *cristata*: with a crest

If you went outside and tried counting the different living things you could find, you'd probably discover hundreds of plants and animals. Imagine how many there are in the entire state, or in all of the United States, or even the world. Scientists estimate that there are at least 10 million different kinds of organisms on the earth.

What's in a Name?

written by Marianne D. Wallace ©2000 / *illustrated by Consie Powell* ©2000

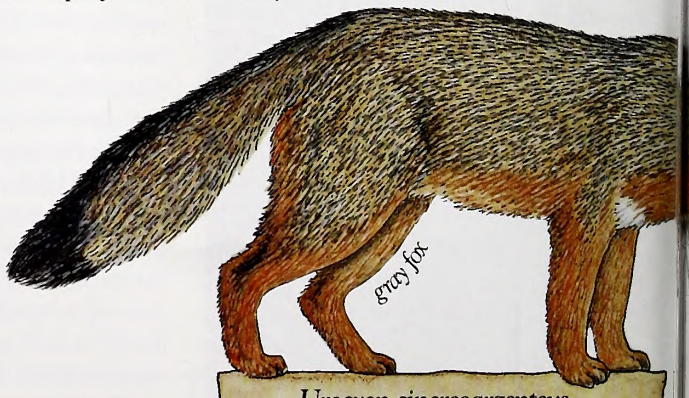
SAY IT IN LATIN

Imagine you are a scientist studying plants and animals about 300 years ago, around the year 1700. You want to write a letter to a scientist-friend telling him about a bee you've discovered. First of all, you don't call it "bee" because you are an educated person and educated people at that time used the Latin language. So you call this new discovery "Apis," which means "bee" in Latin. To distinguish this particular bee from all the other bees that had already been discovered, you describe it with a series of names: "*Apis pubescens, thorace subgriesea, abdomine fusco, pedibus posticis glabris untrinque margine ciliatis*," which means something like "fuzzy, bee, thorax gray below, brown abdomen, foot back smooth a little bag margin hairy." These long strings of Latin words became known as **polynomials** (*poly* means "many" and *nominal* means "name").

ox-eye daisy

Chrysanthemum leucanthemum
chrys: gold; *anthem*: flower; *leuc*: white; *anthem*: flower

The words for the genus (always started with a capital letter) and species (always all lower case letters) usually describe something about the plant or animal. Sometimes, the person who names a new organism will name it after a friend or the place where it was discovered. The names are usually written in Latin or Greek and underlined or written in italics. Words or names that are not Latin are "latinized" for use in a scientific name.

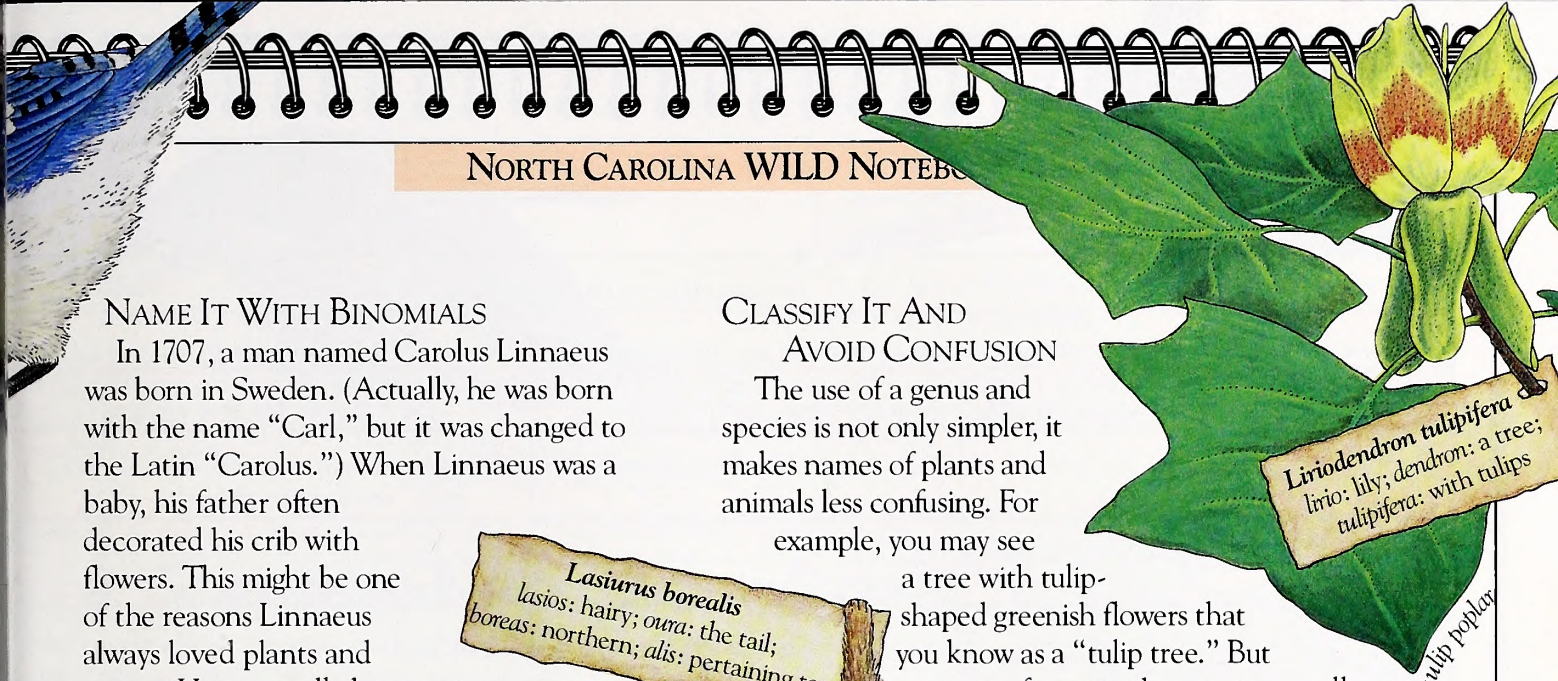

gray fox

Urocyon cinereoargenteus
oura (uro): tail; *kuon (cyon)*: dog; *cinereus*: ash-colored; *argenteus*: silvery

NAME IT WITH BINOMIALS

In 1707, a man named Carolus Linnaeus was born in Sweden. (Actually, he was born with the name "Carl," but it was changed to the Latin "Carolus.") When Linnaeus was a baby, his father often decorated his crib with flowers. This might be one of the reasons Linnaeus always loved plants and nature. He eventually became a teacher of natural science, especially botany, the study of plants. Some of the plants and animals that Linnaeus studied had a long string of names and some had shorter two-part names called **binomials** (*bi* means "two" and *nomial* means "name").

Linnaeus liked the shorter version because it took far less time to name plants and animals that way. So he started using it to name all the plants and animals he listed in his books (writing most of the names in Latin, of course). The first part of the name, the **genus**, was used to refer to a group of related plants or animals. The second part, the **species**, was the name given to only one kind of organism in the genus. That long name for the bee you discovered was shortened to *Apis mellifera* or "honey bee" (*Apis* means "bee" in Latin and *mellifera* means "honey" in Greek). Linnaeus' plant and animal names became so popular that biologists all over the world began to use the same genus and species method. These two names together are now called the **scientific name**.

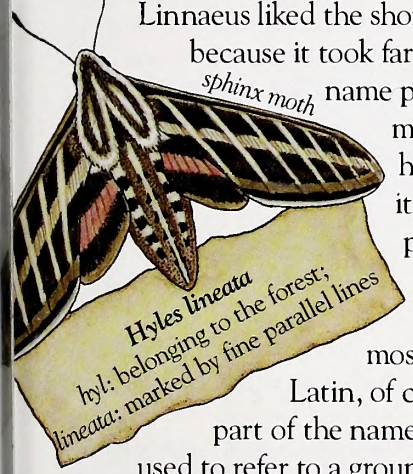


Liriodendron tulipifera
lirio: lily; *dendron*: a tree; *tulipifera*: with tulips

tulip poplar

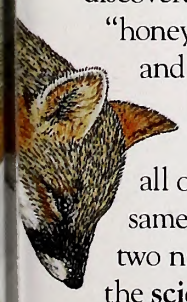
Lasiurus borealis
lasios: hairy; *oura*: the tail; *boreas*: northern; *alis*: pertaining to

red bat



sphinx moth

Hyles lineata
hyl: belonging to the forest; *lineata*: marked by fine parallel lines



CLASSIFY IT AND AVOID CONFUSION

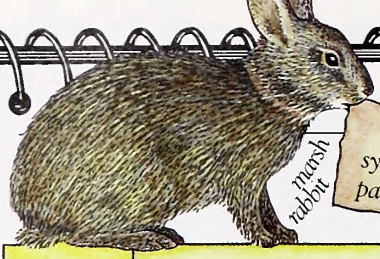
The use of a genus and species is not only simpler, it makes names of plants and animals less confusing. For example, you may see a tree with tulip-shaped greenish flowers that you know as a "tulip tree." But a person from another area may call that same tree a "yellow poplar." It seems these names refer to two different trees. But they are both **common names** for the same tree, *Liriodendron tulipifera* (which means the "lily-tree with tulips" in Latin and Greek).

Just giving things a scientific name wasn't all that was done, however. Genera (more than one genus) of plants and animals were put into larger groups with plants and animals that were similar or related in some way. The eastern cottontail and marsh rabbit are in the same genus (*Sylviglagus*). A similar animal, the snowshoe hare, is in a different genus (*Lepus*) but is grouped into the same **Family**, the Leporidae. These Families with more and more different kinds of animals are also grouped until finally there is the top grouping, **Kingdom** Animalia, which includes all animals.

Naming and grouping organisms is called **classification**. Scientists have used this method for naming and grouping over 1.4 million organisms so far. So if there are about 10 million organisms on the earth, scientists have only 8.6 million to go!

water-lily

Nymphaea odorata
nymph: water sprite, spirit that inhabits water; *odorata*: scented



Sylvilagus palustris
sylvi: woods; *lagus*: hare; *palustri*: marsh or swamp

LINA WILD NOTEBOOK

KINGDOM	*Animalia* (all animals)		
PHYLUM	*Chordata* (those animals that have a notochord or spinal cord; includes mammals, birds, fish, amphibians, etc.)		
CLASS	*Mammalia* (animals that have hair and produce milk)		*Aves*:(animals that have feathers)
ORDER	*Lagomorpha* (all the rabbits, hares and pikas)	*Carnivora* (flesh-eating mammals)	*Anseriformes* (aquatic webfooted birds: ducks, geese, swans and screamers)
FAMILY	*Leporidae* (the rabbits and hares)	*Mustelidae* (weasels, martens, skunks, otters, badgers and their kin)	*Anatidae* (aquatic webfooted birds: ducks, geese and swans)
GENUS	*Sylvilagus* (North American woodland rabbits)	*Spilogale* (small skunks with spots)	*Anas* (dabbling ducks that feed by tipping tail up; spring directly to flight from the water)
SPECIES	*floridanus* (rabbit first described from Florida)	*putorius* (spotted skunks of eastern North America)	*platyrhynchos* (has broad yellow bill and curling tail feathers)

What Does It Mean?

binomial: a name for an organism that has two words in it, such as the genus and species

classification: the grouping of plants and animals by comparing things about them that are the same

common name: the name used by most people in an area to refer to a particular plant or animal

family: a group of related genera

genus (plural: **genera**) and **species**: the two words or names that make up an organism's scientific name. Several related organisms can be in the same genus, but when a species' name is added, that refers to only one type of organism in the world

kingdom: all organisms on the earth are grouped into one of five different Kingdoms. These are: Animalia (animals), Plantae (plants), Fungi (different kinds of fungus), Monera (bacteria) and Protista (things like algae and molds)

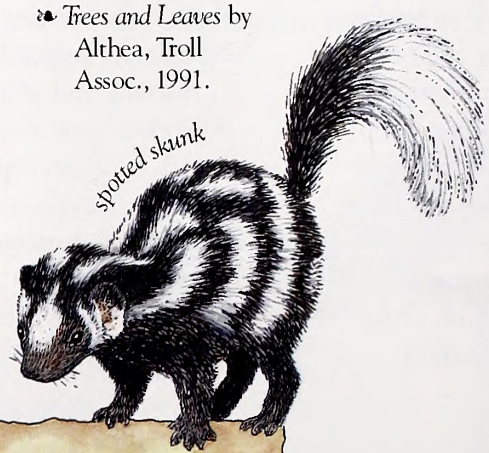
organism: one of many types of life on earth, such as plants, animals, bacteria, molds, etc.

polynomial: a name for an organism that has more than two words in it

scientific name: the genus and species name for an organism. Each organism has only one scientific name

Read and Find Out

- *Fairy Dusters and Blazing Stars* by Suzanne M. Samson, Roberts Rinehart, 1999.
- *First Field Guides (Birds, Insects, Mammals, Reptiles, Trees, Wildflowers)* by various authors for National Audubon Society, Scholastic Inc.
- *Golden Guides (Birds, Fishes, Flowers, Insects, Mammals, Reptiles and Amphibians, Spiders and Their Kin, Trees)* by various authors, Golden Books Publishing.
- *National Geographic Field Guide to the Birds of North America*, National Geographic Society, 1987.
- *Peterson Field Guides*, Houghton Mifflin Company.
- *Salamanders* by Cherie Winner, Lerner Publications, 1993.
- *Trees and Leaves* by Althea, Troll Assoc., 1991.

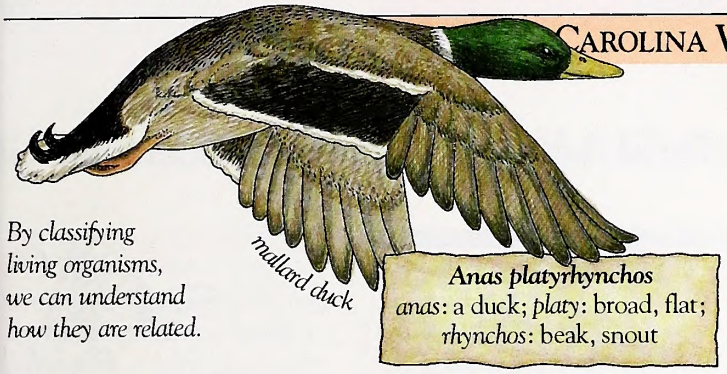


Spilogale putorius
spilos: a spot; *gale*: a weasel; *putoris*: a bad smell

Get Outside

Make a Field Guide: Field guides help visitors identify the plants and animals that can be found in an area. You can make a field guide of your own for visitors to your neighborhood, school or park. First, make lists of the plants and animals you find. Group them according to what type they are. For example, make one list for trees, one for bushes, one for birds, one for insects, etc. Then, by observing, gather as much information about each plant or animal that you can. What color is it? If it's a plant, are the leaves a particular shade of green? Is there an interesting shape to the leaf? What color is the bark? What size is it? If it's an animal, what food does it eat? What noises does it make? Finally, make a drawing for each plant and animal. Combine this drawing with the information about the plant or animal and put it in a notebook. As you find more plants and animals, you can add them to your field guide.

Editing and design by Consie Powell.
Art puzzle by Anne Marshall Runyon.



By classifying living organisms, we can understand how they are related.

mallard duck

Anas platyrhynchos
anas: a duck; *platy*: broad, flat; *rhynchos*: beak, snout

It's WILD!

Project WILD Activities for teachers and students that correlate to this topic include:

Mermaids and Manatees: teaches students, through the comparison of imaginary and real creatures, to describe animals and to see how wildlife can inspire art and myth.

A Scientific Name Game Puzzle

(cut out the plant and animal pieces)

Read the Latin names. Use the English translations to help you place each plant or animal in the puzzle.

Lasiurus cinereus
hairy tail ash colored

hoary bat

Mephitis mephitis
a noxious smell

striped skunk

Sterna forsteri
a tern someone's name

Forster's tern

Tamius striatus
one who hoards striped

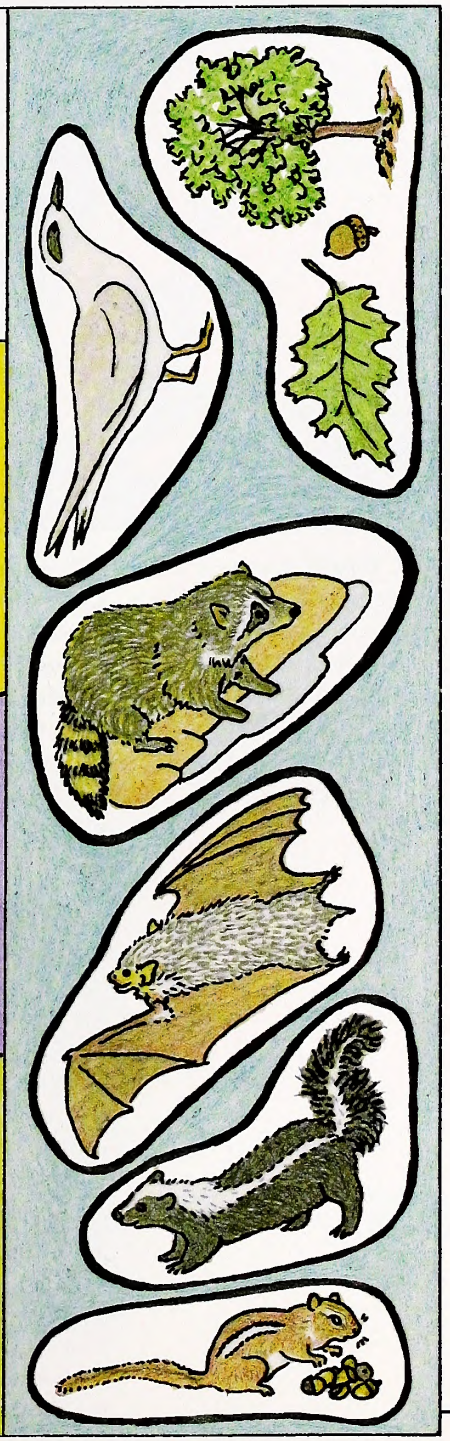
chipmunk

Procyon lotor
before dog washer

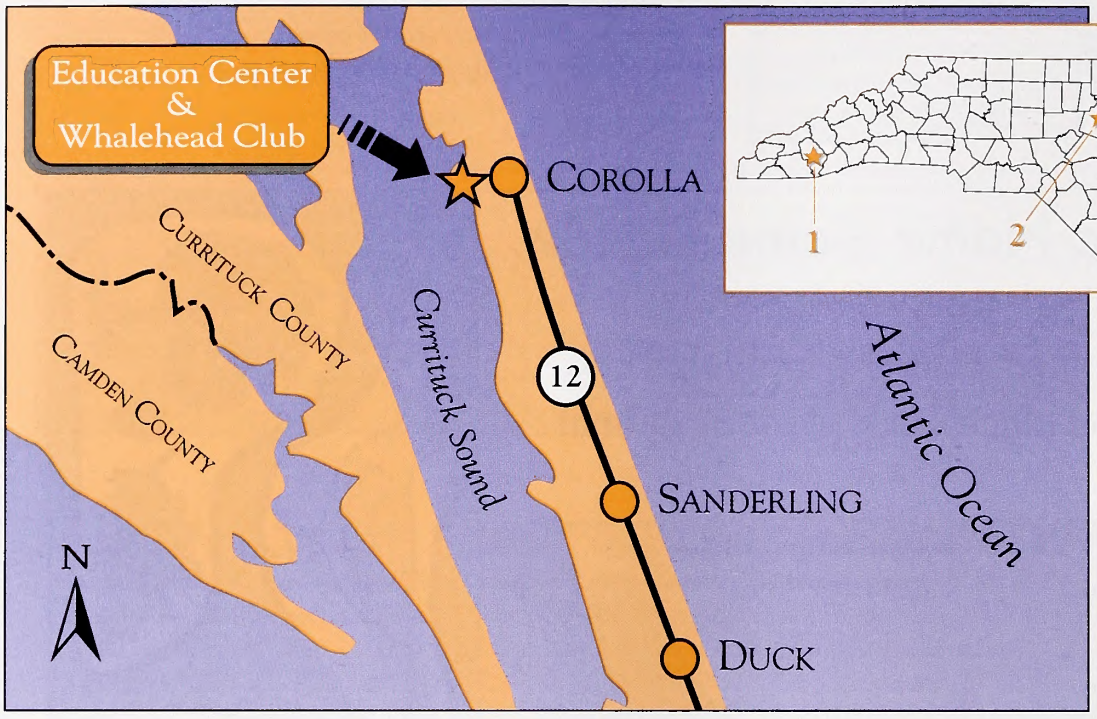
raccoon

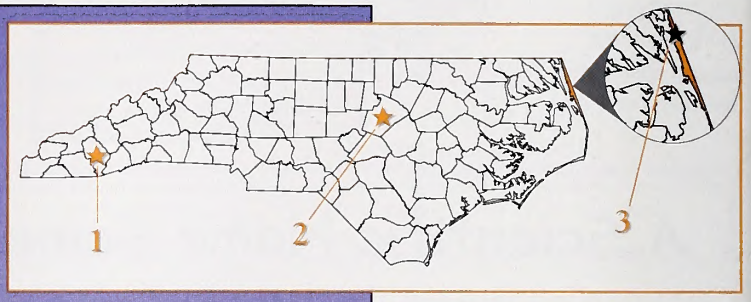
Quercus rubra
oak red

red oak



N.C. Wildlife Resources Commission to Build Additional Educational Centers





Centers for Wildlife Education

1 1998 - The Pisgah Center for Wildlife Education is located in Transylvania County.

2 2003 - Centennial Campus Center for Wildlife Education will be located in Wake County on the campus of N.C. State University.

3 2002 - The Outer Banks Center for Wildlife Education will be located in Currituck County adjacent to the Whalehead Club.

***The N.C. Wildlife** Resources Commission recently adopted plans to construct two new wildlife education centers—one in Wake County and another in Currituck County. The Pisgah Center for Wildlife Education, in Transylvania County, was recently completed.*

Edited by Chris Powell

Seeing the success of the Pisgah Center for Wildlife Education in Transylvania County, the N.C. Wildlife Resources Commission recently adopted plans to begin constructing similar facilities at Corolla, in Currituck County, and on the N.C. State University campus, in Raleigh.

Once the new education centers are completed, the three facilities will serve as regional focal points to educate the public about wildlife and environmental conservation concepts and issues.

"Since we began developing the Pisgah Center for Wildlife Education, we have been elated with the public response," said Sid Baynes, Chief of the Division of Conservation Education. "While we thought that we were dreaming big, the number of visitors and program participants at the Pisgah Center has exceeded our expectations. In many ways, the development of similar facilities at Raleigh and Corolla is really coming in response to public demand and interest."

Scheduled to open in 2002, the Outer Banks Center for Wildlife Education will be a 24,000-square-foot facility located on the grounds of the historic Whalehead hunting club, in Corolla. The club mansion, which will be open to the public, is being restored close to its original state by the nonprofit Whalehead Preservation Trust.

Located adjacent to Whalehead, the educational center will overlook Currituck Sound and contain classrooms, an auditorium, a gift shop and large exhibit gallery. The center's theme will be fishing and waterfowling heritage, featuring decoys, assorted artifacts, old photographs, a sound exhibit complete with a freshwater aquarium and more. In addition, the facility will be used to educate the public about coastal ecology with estuarine programs and exploratory trips into the marshes of Currituck Sound.

Scheduled for completion in 2003, the Centennial Campus Center for Wildlife Education will be located on the first floor of the Wildlife Commission's new administrative building on N.C. State University's Centennial Campus, in Raleigh. The themes presented at this facility will include wildlife in urban environments, the use of technology in wildlife conservation, careers in wildlife conservation and the use of "green" concepts in the construction and use of the building itself. Like the others, this center will feature an auditorium, classrooms, exhibits, outdoor natural areas and more.

—Chris Powell

Record Number of Aquatic Species Found at Sandhills Game Land

A recent aquatics inventory of the Wildlife Commission's Sandhills Game Land and surrounding areas has revealed two species of fish never recorded before in the Yadkin-Pee Dee drainage basin.

During an 18-day period sampling area systems and creeks, wildlife biologists collected the brook silverside at three sites and the larval sea lamprey at a single site. Neither fish species had been collected from the area before. The brook silverside (*Labidesthes sicculus*) is typically associated with freshwater areas such as rivers, lakes and streams. It is a recent exotic to North Carolina waters, having arrived in the Waccamaw/Lumber area during the past few years.

Sea lampreys (*Petromyzon marinus*) are parasitic fish that use their disc-like mouths to attach and feed off other fish. Typically, adult sea lampreys migrate to the sea to feed and return to fresh water to spawn, said Brian Watson, a nongame wildlife biologist who is heading up the aquatics inventory of the state-owned game lands.

"Also worthy of note is that we documented the continued presence of the Sandhills chub (*Semotilus lumbee*) and the pinewoods darter (*Etheostoma mariae*)," Watson said. "Both species are localized to the Sandhills region and just across the state line into South Carolina. These fish are found nowhere else in the world."

In addition, the mossy valvata snail (*Valvata sincera*), Carolina creekshell mussel (*Villosa vaughaniana*) and Carolina darter (*Etheostoma collis*) were all documented in Richmond County.

All totaled, 57 fish, 11 snails, six crayfish as well as six unionid and clam species were collected at the Sandhills Game Land. The Waccamaw crayfish (*Procambarus braswelli*), an endemic species to a small area of North Carolina, was found at two sites in Scotland County. This documents the expansion of its known range into the upper Lumber River basin. Another species of crayfish located was the red swamp crayfish (*Procambarus clarkii*), an exotic which was only recently discovered in the Richmond County area. Aimee Fullerton, a nongame technician who is participating in the inventory, said exotic crayfish are most likely being transported around the state by anglers.

"If fishermen are going to use crayfish as bait, we urge them not to release live crayfish back into area waters," Fullerton said. "One crayfish can contain hundreds of eggs. These introduced species compete with native species for food and can alter the flow of energy through aquatic systems."

Funded by the Natural Heritage Trust Fund, the aquatics inventory of state-owned game lands was intitiated in 1998 and should be completed by 2001. The goal is to inventory streams, creeks, rivers and swamps to ascertain what aquatic species exist. Biologists look for freshwater snails, mussels, pea clams, limpets, crayfish and fish species.

—*Chris Powell*

KEN TAYLOR

***Wildlife biologists use a seine net to** document aquatic species. A recent inventory of the Sandhills Game Land and surrounding areas has revealed a number of surprising finds.*

On Patrol

***Editor's note:** Listed below is a report of a situation that exemplifies the always-unpredictable nature of North Carolina Wildlife Resources Commission enforcement officers' duty.*

Wildlife Enforcement Sgt. Darryl Burge was traveling home from district training recently, when he noticed a wrecked UPS truck sitting backwards on the side of the highway near Murphy. The driver's side of the windshield was completely broken out; however, the driver was in his seat and appeared to have only minor cuts. When Burge asked the driver what caused the accident, the fellow pointed to a 20-pound gobbler lying in the floorboards. (Thank goodness opossums don't fly.)

Duke Energy's Environmentally Friendly Nuclear Station Recognized

Duke Energy's McGuire Nuclear Station was recently recognized by the N.C. Wildlife Federation for participating in its Wildlife and Industry Together (WAIT) program, designed to foster public awareness and participation in conservation, wildlife restoration and wildlife protection activities.

Companies participating in WAIT agree to convert a portion of their property into wildlife habitat, appoint an employee committee to coordinate the WAIT plan for the site and develop educational opportunities for employees and the local community.

Environmental projects on the Huntersville company's 700-acre site include wildlife food plot areas, bluebird trails, a butterfly garden, mile-long nature trail, wood duck houses and fish-friendly habitat. McGuire employees, local community groups and environmental partners also have teamed together to host wildlife activities including Clean Cast fishing events; release of wild turkeys; reintroduction of osprey; bluebird and fledgling counts; bird inventories and nature trail walks.

VAL PATTERSON

Chuck Rice (left), *executive director of the N.C. Wildlife Federation, presents a Wildlife and Industry Together certificate to Brew Barron, vice president of McGuire Nuclear Station. The certification recognizes Duke Energy's work toward creating wildlife habitat on its grounds.*

"We're pleased to accept this award recognizing McGuire's wildlife habitats and activities," said Brew Barron, vice president of the McGuire Nuclear Station. "Promoting and maintaining a healthy environment is part of our operating plan. Environmental partnerships and well-managed wildlife projects benefit us all, and we plan to continue this long-standing tradition."

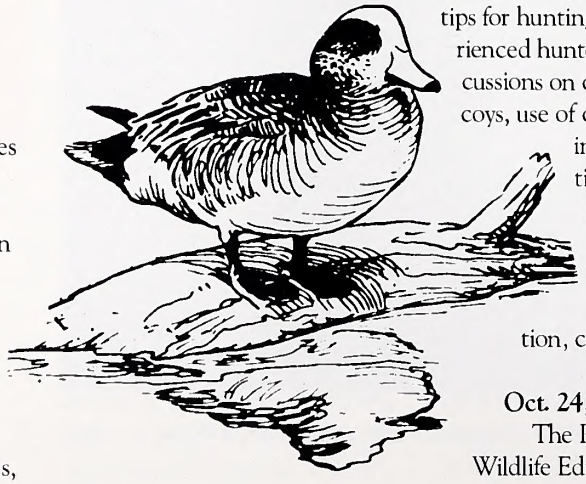
—Courtesy of the N.C. Wildlife Federation

North Carolina Outdoor Calendar of Events

On several occasions, events in this calendar have been changed without notice. Readers should check with the contact listed before traveling to an event. Items for listing should be conservation oriented and should be sent at least four months in advance.

October 7

The N.C. Wildlife Resources Commission's Hunter Safety Program along with the Elizabeth City Parks and Recreation Department will host its second annual "Fun, Safety and Education Day" from 10 a.m. until 4 p.m. Over 75 exhibitors will be on hand, and admission is free. The event is designed for children of all ages, and will be held at Knobbs Creek Recreation Center in Elizabeth City. For more information, call Terry Boyce (252) 335-2776, or Bobbi White (252) 338-3981.



Oct. 14

The Pisgah Center for Wildlife Education, located near Brevard, will conduct a waterfowl hunting program from 9 a.m. to 12:30 p.m. Designed for participants ages 12 and up, this program focuses on tips for hunting waterfowl. Experienced hunters will present discussions on calling, use of decoys, use of camouflage, hunting strategies and tips, use and training of hunting dogs, safety concerns and equipment. For more information, call (828) 877-4423.

Oct. 24, 25 & 26

The Pisgah Center for Wildlife Education, located near Brevard, will conduct a Hunter Safety Course from 6 p.m. to 9:30 p.m. This program is designed to promote the safe handling of firearms and archery equipment, to teach responsible and ethical conduct, and to explain the importance of wildlife management laws and regulations.

Oct. 26

The Pisgah Center for Wildlife Education, located near Brevard, will conduct The World of Bats program from 4 to 5 p.m. This discussion and slide presentation on Western North Carolina's bat species focuses on bat habitats, research projects, bat myths and information on bat houses.

Field Notes

Eastern Gun Deer	Oct. 16-Jan. 1
Eastern Bow and Arrow Deer	Through Oct. 7
Central Bow and Arrow Deer	Through Nov. 4
Northwestern Bow and Arrow Deer	Through Nov. 11
Western Bow and Arrow Deer	Through Oct. 7 and Oct. 16-Nov. 18
Eastern Muzzleloading Deer	Oct. 9-Oct. 14
Western Muzzleloading Deer	Oct. 9-Oct. 14
Central Muzzleloading Deer	Nov. 6-Nov. 11
Black Bear	See *Regulations Digest*
Wild Boar	Oct. 16-Nov. 18
Red & Gray Squirrel	Oct. 16-Jan. 31
Fox Squirrel	Oct. 16-Dec. 30
Fox	See *Regulations Digest*
Raccoon and Opossum	Oct. 16 (sunrise)-Feb. 28
Ruffed Grouse	Oct. 16-Feb. 28
Mourning Doves (first season)	Through Oct. 7
Rails, Gallinules and Moorhens	Through Nov. 11
Crow	June 1 to Feb. 24 plus Labor Day
Bobcat	Oct. 16-Feb. 28

Migratory waterfowl regulations unavailable at press time. For waterfowl season and limits, call 1-800-675-0263 after Labor Day. Information on bag limits, either-sex deer season and other regulations may be found in the *2000-2001 North Carolina Inland Fishing, Hunting & Trapping Regulations Digest*. For a copy, check with license agents or contact the N.C. Wildlife Resources Commission at (919) 662-4370.

Employees Recognized for Excellence

MELISSA McGAW

Three N.C. Wildlife Resources Commission *employees recently received Awards of Excellence for outstanding work in wildlife conservation. Using a peer system, the Division of Wildlife Management decides who will receive the awards each year. From left are Wildlife Commission Chairman John Pechmann; Sea Turtle Project Coordinator Ruth Boettcher, Wildlife Biologist of the Year; Kimberly McCargo, Technician of the Year; David Denton, Technician of the Year; and Wildlife Management Division Chief David Cobb.*

The 2001 North Carolina Wildlife Calendar is Here!

"Heritage Preserved" by Curwood Harrison is one of 12 fine paintings featured in the 2001 North Carolina Wildlife Calendar. *Order now before it's sold out.*

The works of Robert B. Dance, Robert C. Flowers Jr., Duane Raver, Dempsey Essick, Tim Larson, Cotton Ketchie, Keith Hendrickson, Curwood Harrison, James A. Brooks, Mel Steele, Robert Herr and Amy Gardner Dean are featured in the *2001 North Carolina Wildlife Calendar*.

Order yours today! Payment must accompany your order. Calendar orders may be charged to VISA or MasterCard, or enclose your check or money order (payable to NCWRC). Complete the form below and mail with payment to:

2001 Calendar, N.C. Wildlife Resources Commission
1710 Mail Service Center, Raleigh, N.C. 27699-1710
(Office is located at 322 Chapanoke Road in Raleigh.)

A GREAT GIFT!

Please send me _____ Calendars at $6.00 each . . . . . .$_____

All N.C. residents add $.36 sales tax per calendar . . . . . _____

☐ Enclosed is my check for **total** payment of . . . . . .$_____

☐ Charge to MasterCard or VISA for the calendar(s) ordered above. My card number is _____ and the expiration date is _____/_____.

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Card holder signature | Day Time Phone No.

If ordering 10 or more calendars, please provide your UPS deliverable address.

Name _____

Address _____

City/State/Zip_____

Phone (_____) _____

All orders must be prepaid. A $20 charge will be made on returned checks (N.C.G.S. 25-3-512). **For fund raising and bulk rate information (10 calendars or more), call 919-662-4377. Please allow 4 weeks for delivery.**

Catch Us at These Numbers

- **1-800-662-7137** to report violations of hunting and fishing laws.
- **1-800-628-3773** (NC VESSEL) for boat registration and titling.
- **1-800-675-0263** for hunting dates and shooting hours for migratory game birds.
- **1-888-248-6834** (2HUNTFISH) to purchase most licenses with VISA or MasterCard using a touch-tone telephone.
- **1-800-446-8663** (I GOT ONE) to report big game harvests.
- Connect to the Commission's online web site at **http://www.ncwildlife.org**

The N.C. Wildlife Resources Commission maintains five toll-free telephone numbers to provide better services and convenient access to information for North Carolina citizens. Calls are answered in order, but some numbers may require a wait during busy seasons.

VISA MasterCard

Wildlife Endowment Fund Report

Totals Through July 2000

Principal Balance
$30,353,145.53

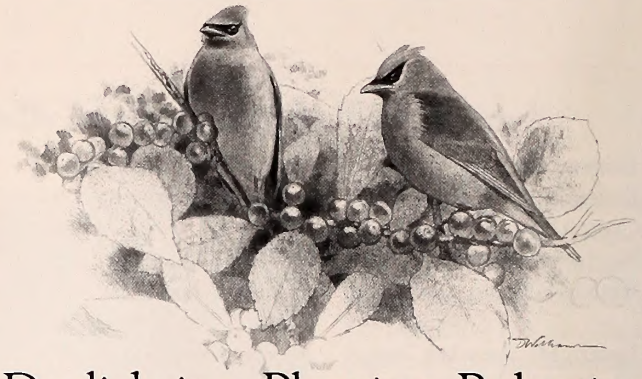
Interest Earned
$31,265,396.00

Total Receipts
$61,618,541.53

Interest Used
$20,436,178.04

Fund Balance
$41,182,363.49

Established on May 29, 1981, this fund is derived from the sale of lifetime hunting and fishing licenses and lifetime subscriptions to *Wildlife in North Carolina* magazine as well as from tax deductible contributions. While the interest may be used to supplement N.C. Wildlife Resources Commission programs, the principal remains invested to generate additional interest for the future.



Daylighting, Planting, Releasing

by Rodney Foushee

Now that you've learned the value of early-successional habitats for wildlife, consider creating some openings on your land.

Daylighting: Opening up overgrown roadbeds and paths to allow sunlight to reach the forest floor is a great way to create early-successional habitat on your property. To allow sunlight to reach the ground, you must first remove trees and other vegetation from the roadbed or adjacent areas. This can be accomplished by firewood cutting, logging or "bush-hogging"—depending on the size of the opening you plan to make. For roadbeds, it is best to remove trees on each side of the road to allow the sunlight to fully penetrate the forest. Try to pile treetops and large limbs along the edge of the road to provide cover for small animals.

Your daylighting efforts will not go unrewarded. Come next spring, you should begin to see a dramatic regrowth of vegetation as weeds, vines and grasses flourish in the sunlight. More important, this new opening should provide nesting cover and excellent foraging for a variety of wildlife including wild turkeys, deer, songbirds, rabbits and quail.

Planting and Releasing Fruit: October is a good month to begin planting fruit-bearing trees such as apple, dogwood, crabapple, cherry and mulberry on your land. Fruit-producing trees offer a valuable food source for many varieties of wildlife, and fall planting gives the trees' roots a chance to take hold before winter sets in. Young trees can be protected with plastic or wire shelters to prevent excessive damage from deer and other browsers.

While you're in the woods, this is a great time to mark overgrown and neglected fruit trees for "releasing" later in the winter. Look for neglected apple trees near old home sites and abandoned orchards. Overgrown wild trees including crabapple, persimmon and holly can be easily identified by the fruit still clinging to their branches. Mark the trees with brightly colored flagging so that in late winter you can locate them to cut back larger trees and vines that block sunlight.

Once released from the confines of other vegetation and thoroughly pruned, these trees should produce a bounty of fruit for wildlife next fall.

N.C. WILD STORE

Dazzling Butterflies

We've chosen a brilliant selection of rare and common butterfly species for our newest posters. Seventeen common butterflies and 19 rare species, in all their radiant color, adorn the posters. Range maps depict where each butterfly is found, and informational text highlights the connections between the butterflies and their habitats.

Common North Carolina Butterflies

What's the wing span of a Question Mark butterfly? Learn this and much more from this educational poster. 22" x 34". $8.
ITEM CODE **P15**

Rare North Carolina Butterflies

Learn why these species are considered rare or endangered. 22" x 34". $8. ITEM CODE **P16**

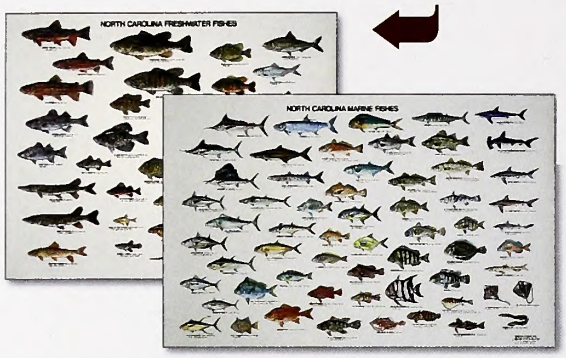
Butterfly Posters Set

Buy both posters and save! $14. ITEM CODE **P17**

All proceeds from the sale of these products support the development and production of conservation education projects and programs.

N.C. WILD STORE

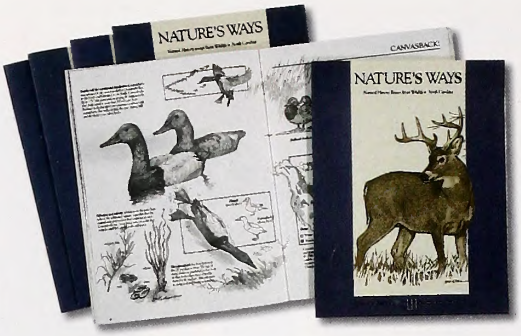
North Carolina's freshwater fish and marine fish are colorfully displayed on individual posters, and feature the art of Duane Raver. Reel yours in today!



Fishes of North Carolina

Set of 2. Freshwater fish poster shows 36 state species (size 28" x 22½"). Marine fish poster shows 60 species (size 35" x 22½") $10.

ITEM CODE P9



Nature's Ways Collection

Explore the wonders of the natural world, wildlife species and ecosystems through "Nature's Ways." More than 200 essays from *Wildlife in North Carolina* have been compiled in a beautiful 6-volume paperback set. $27.50.

ITEM CODE M9

Also available as a boxed set. $30.

ITEM CODE M10

Before going on your next outdoor hike or camping trip, be sure you know North Carolina's reptiles.

Reptiles of North Carolina

Set of 4 posters in full color. Each poster decribes the species and denotes which reptiles are on the endangered, protected or special concern list. A set includes: lizards, turtles, and both live-bearing snakes and egg-laying snakes. Posters are sized 22" x 34". $18. ITEM CODE P10

Amphibians of North Carolina

The Hylid Frogs. North Carolina's tree frogs, cricket frogs and chorus frogs, belonging to the large family *Hylidae*, are presented in this colorful poster, one of two frog posters in the Amphibians series. 22" x 34". $6.

ITEM CODE P11

Amphibians of North Carolina

True Frogs and Toads. The second poster in the Amphibians series showcases true frogs and toads. Vibrant photos combine with informative text to make it a standout in the classroom or at home. 22" x 34". $6.

ITEM CODE P14

Waterfowl Decoys of N.C.

Nineteen classic waterfowl decoys from North Carolina's legendary days of waterfowl hunting have been collected for the first time on this framable, high-quality poster. This is the first in a series of "Sporting Heritage" posters. 22" x 34". $10.

ITEM CODE P12

Traditional Trout Flies of the Southern Appalachians

Sixteen traditional trout flies are presented in stunning color detail. Each fly is accompanied by a brief history of its development and use in Appalachian waters as well as the components that make up each hand-tied creation. Second in a series of "Sporting Heritage" posters. 22" x 34". $10. ITEM CODE P13

Bird Houses & Feeders: How to Build and Enjoy Them

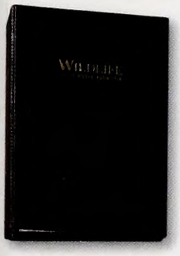
An eight-page illustrated guide to building bird houses and feeders. $2.

ITEM CODE M6

NOW IN PAPER-BACK!

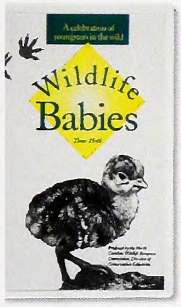
DOGS THAT POINT, FISH THAT BITE

Here are 50 of the best "Our Natural Heritage" columns written by Jim Dean for *Wildlife in North Carolina* over the past 17 years. Published by the University of North Carolina Press and the N.C. Wildlife Resources Commission. 220 pages. Hardbound $19.95. ITEM CODE **M8**
Paperback $10.95. ITEM CODE **M12**



MAGAZINE BINDER

Store 12 issues of *Wildlife in North Carolina* in a sturdy binder. $10.
ITEM CODE **M2**



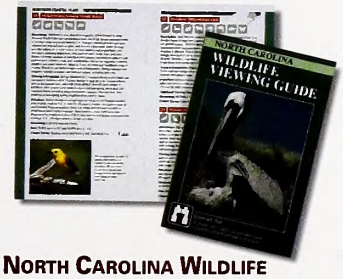
WILDLIFE BABIES VIDEO

Entertaining 25-minute video version of the classic 1965 Jack Dermid film reveals springtime antics of young wood ducks, black bear, possums, cottontails and others . $20.
ITEM CODE **N9**

Based on Chief Seattle's 1855 speech, the film's focus is on environmental ethics. Accompanied by This Land Is Sacred, this film is a must-see for everyone. It is destined to become a classic.

ALL THINGS ARE CONNECTED

Video and Activity Guide. $22.
ITEM CODE **W3**



NORTH CAROLINA WILDLIFE VIEWING GUIDE

From Cape Hatteras to the Great Smokies, *North Carolina Wildlife Viewing Guide* will lead you to 90 of the state's premier wildlife viewing locations—and better your chances of seeing wildlife once you get there. $5.95. ITEM CODE **N6**

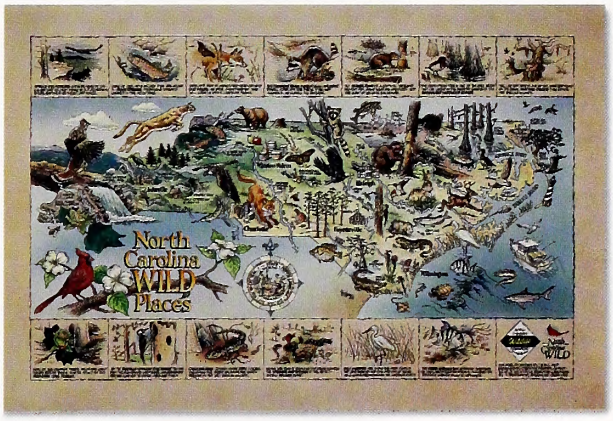
GARDENS FOR BUTTERFLIES

Article reprint from *Wildlife in North Carolina* magazine for the gardener who wants to attract some of nature's most colorful creatures. $2. ITEM CODE **M5**

SCOUTING CORRELATIONS

Cub, Boy and Girl Scout requirements are correlated to Project WILD and Aquatic WILD activities. Supplements Scout leaders' planning materials and events. Each $3.
Cub & Boy Scout Correlation. ITEM CODE **E9**
Girl Scout Correlation. ITEM CODE **E10**

North Carolina's wildlife habitats come alive in this 82-page, easy-to-read, soft cover book. With delightful illustrations by Anne Marshall Runyon, N.C. WILD Places covers 13 habitats across the state.



NORTH CAROLINA WILD PLACES: A CLOSER LOOK

Book and Posters Set. With each book you'll receive two habitat posters (also by Runyon) and a N.C. WILD Places Map poster, featuring the art of Jackie Pittman. $16. ITEM CODE **E6**

WHILE SUPPLIES LAST!

NORTH CAROLINA WILD PLACES TEACHER'S GUIDE

For teachers using *North Carolina WILD Places* in the classroom, these activities and games will heighten student awareness of wildlife habitats. $6.
ITEM CODE **E7**

More terrific items

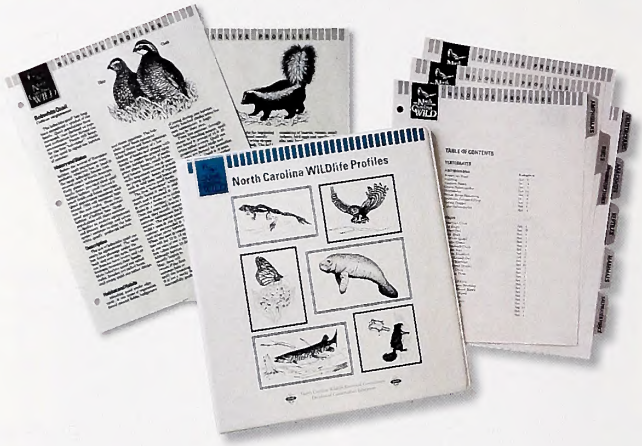
N.C. WILD STORE

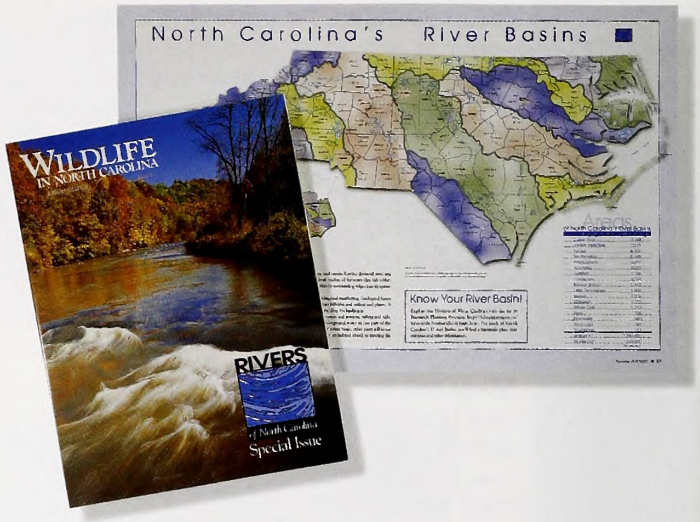
N.C. WILDLIFE PROFILES BINDER & N.C. WILDLIFE PROFILES SETS 1-12

This top-quality 3-ring binder includes:

- 120 illustrated fact sheets, each profiling an animal's history, status, habitat and behavior, and also containing a range map.
- Tab dividers that organize 12 sets of wildlife fact sheets by class.
- A table of contents, index and instruction sheet.

$30. ITEM CODE W17





RIVERS OF NORTH CAROLINA

This 128-page special issue of *Wildlife in North Carolina* examines issues relating to North Carolina's rivers, from canoe trips to water-quality to the real-life stories of people working to save our rivers.

For timely coverage of all of North Carolina's river basins, as well as eye-catching photos and educational maps and graphics, there's nothing else like it on bookshelves anywhere. Order "Rivers of North Carolina" for your own bookshelf, or give it to friends and family members to enjoy. For $10, plus shipping and postage, you'll have a coffee-table edition that's already being hailed as a classic. $10. ITEM CODE M11

EMBROIDERED CAPS

N.C. WILD Caps. N.C. WILD cardinal on two-tone, brushed-cotton twill cap with a Velcro® closure. **$16.50 each.**

- Tan cap with forest green bill. ITEM CODE A1
- Tan cap with burgundy bill. ITEM CODE A10

Wildlife in North Carolina Caps. Exclusive designs and magazine logo are featured on four different cap styles. **$16.50 each.**

- Deer silhouette on 6-panel, solid back cap. Advantage® Camouflage on cap and bill with plastic snap. ITEM CODE A11
- Brook trout on sage-colored, brushed cotton cap with an unstructured front, extended bill, and nubuck suede closure. ITEM CODE A3
- Deer silhouette on blaze orange cap with brown waxcloth bill. ITEM CODE A7
- Deer silhouette on Advantage® Camouflage cotton cap with tan suede bill. ITEM CODE A6

PISGAH CENTER FOR WILDLIFE EDUCATION T-SHIRT

100% cotton natural color tee with design on back and Pisgah logo on front. $14.50.

ITEM CODES:
A8MED (medium)
A8LRG (large)
A8XLG (extra large)
A8XXL (extra extra large)

WEE TEES

Just like the adult shirt with Pisgah design, only smaller.

ITEM CODES:
A9XS (extra small; size 2-4) $10.
A9SM (small; size 6-8) $12.50.
A9MD (medium; size 10-12) $12.50.
A9LG (large; size 14-16) $12.50.

WILDLIFE IN N.C. T-SHIRT

WINC magazine logo on front pocket. Tundra swan art on back. White. $14.50. ITEM CODES:
A5MED (medium)
A5LRG (large)
A5XLG (extra large)
A5XXL (extra extra large)

N.C. WILD T-SHIRT

N.C. WILD logo printed on front and colorful art on back. White. $14.50. ITEM CODES:
A4MED (medium)
A4LRG (large) ☛ SOLD OUT
A4XLG (extra large)
A4XXL (extra extra large)

FALL COLOR.

N.C. WILDLIFE RESOURCES COMMISSION

Do you really want to spend this glorious season listening to mall music? You could be here, taking in this view and enjoying the sound of falling water while we take care of your holiday shopping.

Just visit the N.C. Wild Store (on pages 37-40)—there's something for everyone on your Christmas list. Or use the convenient order forms on the cover wrap to send gift subscriptions to

WILDLIFE
IN NORTH CAROLINA

On the Prowl

Early stages of forest succession are critical for many wildlife species, including bobcats. For more on practices that create and maintain open habitats in western North Carolina, see the story beginning on page 14.

Periodicals postage paid at
Hickory, North Carolina

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WILDLIFE IN NORTH CAROLINA

NOVEMBER 2000 $1.50

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The Closing Window

by Jim Dean ©2000

MELISSA McGAW

". . .the farm has changed little since I was a child, but the woodlots have grown up, the crops are different, and our game populations reflect those changes."

When Mike Gaddis pulled into the yard of my small cabin at the family farm one day last winter, I had some bad news for him. "The field where we've been finding that covey of bobwhites has been mowed," I said. "I forgot to tell Curtis to put that one on the 'don't cut' list."

"Hate to hear that," Mike said. While I checked the oil lamps to make sure they were full, Mike lit a fire in the wood stove and damped it down so the cabin would be warm after we finished hunting.

Mike and I have hunted together for years, and we've particularly enjoyed hunting my family's Granville County farm since I took over its operation when Dad retired some 15 years ago. To the unpracticed eye, the farm has changed little since I was a child, but the woodlots have grown up, the crops are different, and our game populations reflect those changes. Where once there were seven coveys of birds, there now may be no more than one or two and we rarely see a rabbit. Forty years ago, these fields were crisscrossed with rabbit trails. There were few white-tailed deer in this part of the state back then, but now they are so numerous that you can't put your foot anywhere without stepping in a track. My brother has playfully accused Curtis King, whose family has lived and farmed here since 1953, of running a disk equipped with deer feet over the fields at night when no one is looking. Turkeys have also moved in, favoring the mature hardwoods. Both those species have benefited from an aggressive restoration program and changing habitat that favors them, but as thrilled as we are to see them, we still miss our birds and rabbits.

Back in the mid-1980s, I created 26 acres of wildlife habitat under the federal Conservation Reserve Program, and I also began opening small, scattered clearcuts along the edges of fields. It has improved small-game food, nesting and winter cover, but our soybean production has suffered lately and, more and more, the farm is surrounded by homes and small businesses.

On this day, it appeared our fate lay in one known covey that might have just lost its winter pantry. We let Kate out of the dog box and began our familiar rounds. The weather was perfect—cold, overcast, solemn. A bobwhite would smell sweet to a dog, and the crisp air, waft of pine and rattling drag of brush on chaps gave us that old sense of confidence. Kate hunted beautifully, skimming the edges of fields and plowing through bottomland thickets, but after three hours, she had checked out all the places she had found birds before.

"Let's try that field even if it has been cut," Mike suggested. We followed Kate back through the farm to the edge of the sloping field. I could see smoke curling from the cabin chimney just beyond the crest of the hill. Kate took the five acres in a whirl. Nothing.

"I'm afraid this is all connected in a way that isn't very promising," Mike said as we sat in front of the fire later. He explained that many hunters tend to look at the increased numbers of deer, turkey and a few other high-profile species as evidence that we've somehow turned the corner. True, their restoration in North Carolina and elsewhere has been a remarkable success story. Yet, quality habitat is still changing or disappearing rapidly, and what has happened to small game in the East could very well happen to deer, turkeys and other relatively abundant game species during the next 20 to 30 years. Indeed, Mike is afraid that such an eventuality is almost certain unless a way is found to protect and manage very large, connected tracts of both private and public land—not just scattered islands like this farm.

"I fear we are momentarily in a window that is going to close even for species that are currently thriving," he lamented. "Wildlife can't live in housing developments, malls and parking lots. The habitat just isn't there anymore in sizable chunks, and even adaptable species like deer and turkeys are eventually going to find it tough to survive. And what about predator and chemical impacts, or other factors we don't clearly understand? I don't think this is any time to celebrate, but I hope I'm wrong. I would dearly love to be wrong."

It was nearly dark when Mike loaded Kate into the truck and drove out the dirt path to the highway. I left the fire and walked out onto the porch. A full moon lit the fields and distant woods. I could hear the steady drone of interstate traffic less than a mile away. Somewhere nearby, a bobwhite gave a single, sleepy call. I wanted to believe that it was a sign not to give up hope.

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Wildlife in North Carolina is the official educational publication of the North Carolina Wildlife Resources Commission. It is dedicated to the sound conservation of North Carolina's wildlife and other interrelated natural resources and also to the environment we share with them.

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Wildlife in North Carolina (ISSN 0043-549X) is published monthly by the North Carolina Wildlife Resources Commission, 512 N. Salisbury St., Raleigh, N.C. 27604-1188. Periodicals postage paid at Raleigh, N.C. and additional mailing offices. Subscription rates: one year $7.50, three years $20, lifetime $100. All foreign subscriptions are $23.50 per year. For subscriptions from foreign countries, payment **only** by U.S. Postal Service money order or cashier's check drawn on a U.S. bank. All orders must be prepaid. Please allow 6 to 8 weeks delivery on new subscriptions and address changes. **POSTMASTER:** Send address changes to Circulation Manager, 1711 Mail Service Center, Raleigh, N.C. 27699-1711. Address all correspondence regarding subscriptions to Circulation Manager. If you have a problem with your subscription, dial (919) 662-4377. Articles in *Wildlife in North Carolina* may represent the personal views of authors, and do not imply endorsement by the North Carolina Wildlife Resources Commission. *Wildlife in North Carolina* is available on audio cassette as a courtesy of volunteer services of the Department of Cultural Resources, Library for the Blind and Physically Handicapped, Raleigh, N.C., (919) 733-4376. **The N.C. Wildlife Resources Commission is an equal opportunity agency.**

Hornets at Rest

written by Clyde Sorenson ©2000
illustrated by David Williams

To most people a hornets' nest sounds like a remarkably uncomfortable place to be. The sting of a hornet is notoriously painful, and avoiding an active nest is a wise thing to do. But wasps play an important role in our ecosystem, and the inner life of a hornet's nest is actually quite fascinating. Now that the leaves have dropped from the trees, the large, gray, football-shaped nests of bald-faced hornets are at their most conspicuous and least dangerous. The only bald-faced hornets around now are new queens, dormant in their winter hiding places.

The bald-faced hornet is technically not a hornet at all. It is actually the largest of the 10 or so species of yellowjacket wasps found in North Carolina. Beyond its larger size, the bald-faced hornet differs from the others in its black and white coloration and its habit of nesting high in trees rather than in the ground. (True hornets are much larger wasps native to the Old World. The only species that occurs in North Carolina is the introduced European hornet.) The bald-faced hornet is the most widely distributed yellowjacket in North America and ranges from Alaska to Florida.

In late March or April, a queen will emerge from her winter hiding place and look for a suitable site for her nest; she typically will settle on a slender tree branch, often at a crotch, 5 feet to 40 feet high. She builds a special "queen's nest" that is a bit smaller than a tennis ball, with a 2- to 3-inch tube hanging from the bottom. The nest is constructed of paper made from wood fibers she gathers from exposed wood mixed with saliva. Different wood sources yield different colors of paper, and so the nest ends up striped in various shades of gray. The nest contains a small comb with about 35 cells, and she lays a single egg in each cell. She then hunts insects and harvests nectar to feed her larvae. Once the first few larvae mature to adulthood, the queen's sole job is to lay eggs while her daughter workers hunt, tend the larvae and enlarge the nest. At its peak population, the nest will house between 100 and 400 adult wasps, and before the season ends, the queen may have produced up to 3,500 offspring. A mature nest may be 2 feet long and 1 foot wide.

While they are quite common throughout the state, bald-faced hornets are encountered much less frequently than other yellowjackets, primarily because of the differences in their diets. Several of the smaller species scavenge meat and sugar and thus often make themselves nuisances at picnics and around trash cans. Bald-faced hornets prefer live meat, and they capture much of their prey on the wing. Their favorite targets include flies, caterpillars, bees and, interestingly, other yellowjackets. They are fast and agile enough to catch horseflies. They spend most of their time outside the nest on the hunt, out of human sight.

Toward the end of summer, in August and early September, the workers build larger cells in the comb, and the queen lays eggs that will hatch into both future queens (fertilized eggs) and males (unfertilized eggs). As egg production in the colony slows, the remaining wasps even start feeding excess worker larvae to the developing queens and males. The old queen dies, and the surviving workers become irritable and more prone to sting. Most are dead by the time the new queens and males emerge. The males then swarm near a particularly tall tree or other prominent place and wait for the virgin queens to approach. The males die soon after mating, and the newly mated queens seek hibernation sites. Hard frosts finish off any surviving workers.

Bald-faced hornets are generally well-equipped for self defense, but they do have to contend with natural enemies of their own. They build their nests high on slim limbs to avoid mammalian predators, particularly raccoons. Some birds, including robins and blue jays, may wait near the entrance to the nest and snatch workers as they emerge; the entrance is therefore usually very low on the nest and typically faces toward open space. Tiny parasitic wasps occasionally attack the larvae, and roaches may even take up residence in the nest.

Abandoned nests are sometimes used by other wildlife. Squirrels will often harvest the paper from them to line nests, and small birds have been known to roost in them temporarily. Some admiring humans decorate their dens or offices with particularly attractive specimens.

Clyde Sorenson is assistant professor of entomology at North Carolina State University.

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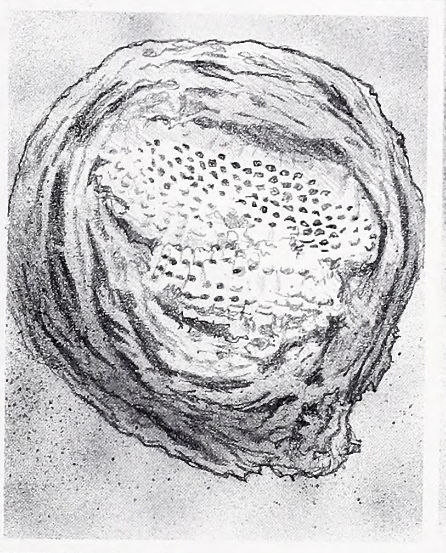
Kate Scarborough, Martin Camm (Illustrator), *Hornets' Nest* (Watch It Grow) (1997).

Surfing the Web

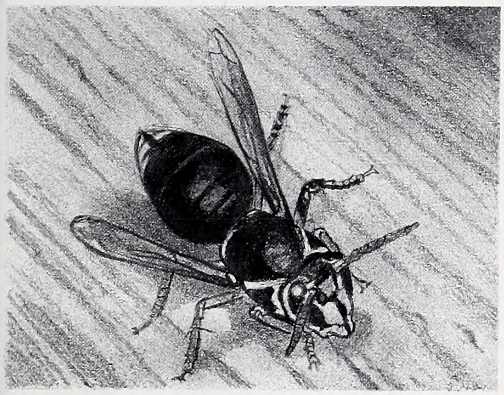
See these web sites for guidance in yellowjacket pest management. *Addresses:*
http://www.uos.harvard.edu/ehs/hot_topics/pom_yellowjacket.html

http://www.ces.ncsu.edu/depts/ent/notes/Urban/rsc-10/rsc10-1.htm

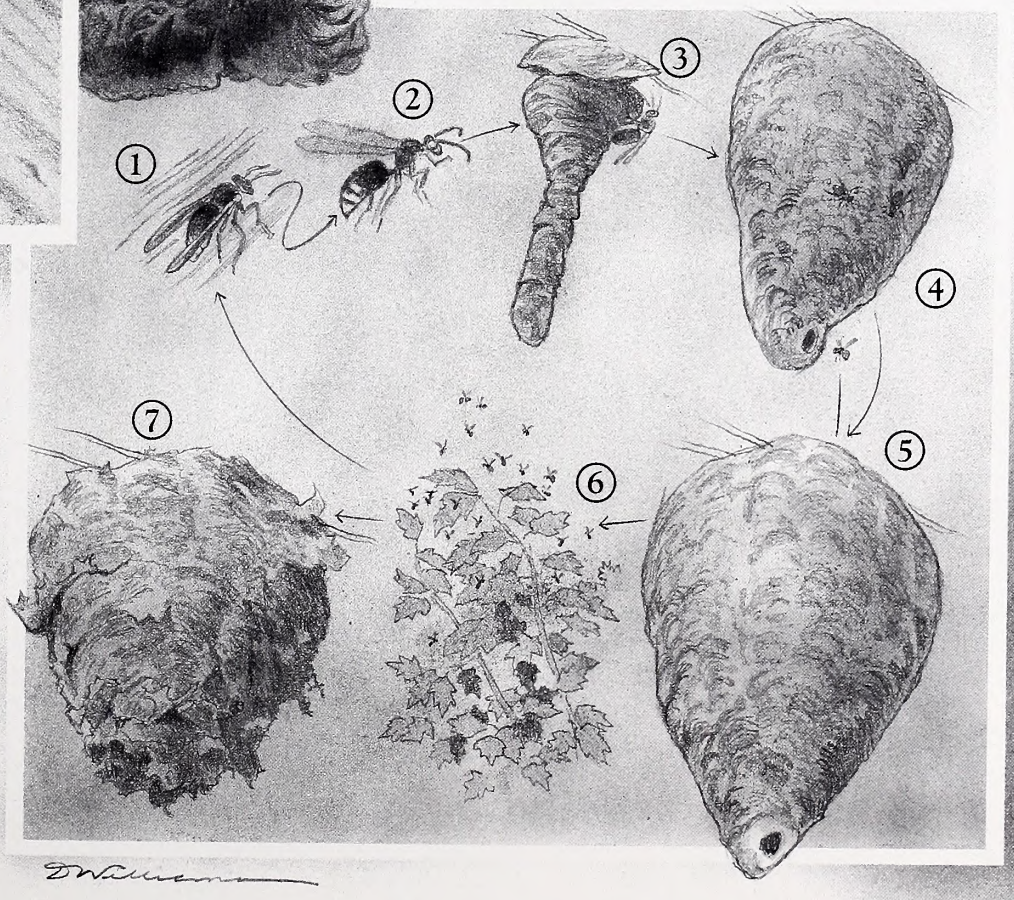
See this site for information about preserving and displaying a hornet's nest. *Address:*
http://www.ipm.iastate.edu/ipm/iiin/bhornets.html



A mature bald-faced hornet *nest consists of several paper combs surrounded by a multi-layer paper envelope. The envelope protects the comb from weather, parasites and some predators.*



Bald-faced hornets *subdue their prey with their strong jaws, often decapitating the insects they capture. They usually reserve their potent stingers for defense against vertebrate predators.*



The annual cycle *of a bald-faced hornet nest begins in winter with a solitary hibernating queen (1). She emerges in March or April (2) and constructs a small nest (3). Subsequent broods of her offspring enlarge the nest (4), and by July or August the colony reaches its maximum size (5). Reproductive hornets are produced in September—emerging males swarm near tall trees where they mate with new queens (6). By the first hard freezes, the nest is abandoned (7), and the only hornets left are new hibernating queens.*

Waccamaw River

Elevated mercury levels in fish have prompted North Carolina to issue a mounting number of warnings for our eastern rivers and the Atlantic Ocean. What can be done to reduce this heavy metal threat to the environment?

Rising

written by Rodney Foushee
photographed by Melissa McGaw

In her conservation classic, *Silent Spring*, Rachel Carson predicted that we humans would eventually poison the Earth through our own industrial processes unless drastic changes were made to protect the environment. Though major strides have been made in some areas to reduce pollution since her book was first published nearly 40 years ago, Carson's dire predictions seem to be holding true when it comes to mercury. One need only look to the rivers and streams of eastern North Carolina for proof. In the past decade the state of North Carolina has issued a mounting number of advisories against eating certain fish tainted with the heavy metal. Last spring the state, along with several other southeastern states, issued a warning against eating large king mackerel from the Atlantic Ocean because of high mercury levels found in the fish.

These fish consumption advisories are not permanent—they can be lifted if lower levels of mercury are found. However, scientists and environmentalists agree that this will not likely happen unless we reduce the amount of mercury that's being released into the environment. Meanwhile, the elevated levels of mercury pose a health threat to North Carolina's fisheries, wildlife and humans.

***The beauty of the** Waccamaw River (above) masks an invisible mercury threat. Many of eastern North Carolina's blackwater rivers and streams contain elevated mercury levels, which accumulate in fish and wildlife.*

One Toxic Metal

Mercury, most commonly seen as a shiny, silver white metal, is a naturally occurring element with many sources in the environment —both natural and man-made. It is also one of the most poisonous substances on Earth.

The toxic effects of this heavy metal on the nervous systems of humans and wildlife have been known for centuries. The phrase "mad as a hatter" originated during the 1800s in England, when mercury salts were commonly used to prepare felt for hat making. The hat makers, or hatters, often developed the shakes and other symptoms of brain damage after being exposed to high levels of mercury. Besides permanent brain damage, mercury can also cause lung and kidney damage and, at high levels, even death. At lower levels, mercury can cause serious neurodevelopmental problems in children. Though mercury is no longer used in the hat-making industry, it is still a product of many modern industrial processes. In fact, scientists estimate that human activities since the beginning of the industrial age have increased the amount of mercury in the atmosphere by a factor of three. Most of this mercury is being released from the burning of coal, waste incineration, mining, chlorine production and other industrial processes.

Mercury is particularly dangerous because once it is released, it doesn't break down and cannot be destroyed. Instead, it accumulates in the environment over time, cycling through the environment in various chemical forms in air, land and water. Mercury vapor can stay airborne—circling the globe—for up to a year. And once mercury is deposited into water, it can be converted by bacteria into methylmercury, a mercury form that is readily absorbed by plants and fish and quickly moves up the aquatic food chain. As smaller fish are eaten by bigger fish (see "The Mercury Connection" on page 9), the mercury is concentrated, or biomagnified, in the tissues of the largest, oldest top-predatory fish.

In the right water conditions, methylmercury makes for a potent poison. According to some estimates, just a drop of mercury in a 25-acre lake can make the fish unsafe to eat. Such mercury-sensitive conditions occur in eastern North Carolina's blackwater rivers and streams, where mercury-converting bacteria flourish among decaying debris in the slow-moving, acidic waters. A relatively simple food web in our eastern waterways also helps concentrate methylmercury in the tissues of a few top predators that include largemouth bass, bowfin and chain pickerel.

"Mercury is so persistent in the environment," explains Kent Nelson, coastal region fisheries supervisor for the N.C. Wildlife Resources Commission. "It takes a long time for mercury levels to decrease in many ecosystems. High levels of mercury can last in some fish for 20 or more years after the mercury source is removed. Eastern North Carolina is very sensitive to mercury. One of the reasons is the large number of wetlands we have. The more wetlands you have, the more bacteria there are to convert elemental mercury to methylmercury, and this is enhanced in the acidic waters of our coastal blackwater rivers. In these mercury-sensitive systems, it really doesn't take much mercury at all to create big problems in fish."

And the problems don't end with fish. Fish-eating wildlife species, including eagles, loons, ducks, raccoons and otters, are susceptible to the effects of mercury. Mercury can cause kidney and nervous system damage in wildlife as well as reproductive failure. A recent casualty—a bald eagle—was found weak and lethargic from mercury poisoning last spring near the North Carolina coastal town of Aurora. Treatment over several months successfully flushed much of the mercury from the bird's system, but it was too late to reverse the permanent damage caused by a lifetime of exposure to the toxic metal. The 2-year-old eagle was euthanized by wildlife rehabilitators in September.

Of course, at the very top of the food chain is man, and it is methylmercury in fish that poses the greatest threat from mercury to public health today. This is why 41 states, including North Carolina, have posted consumption advisories on waters where high levels of mercury have been detected in fish.

"The More We Look, the More We Find"

"Right now, in North Carolina we have 10 advisories for mercury in fresh water and one saltwater advisory on king mackerel," said Dr. Luanne Williams, a toxicologist with the N.C. Department of Health and Human Services. The freshwater advisories recommend limiting consumption of largemouth bass, bowfin and, in some cases, chain pickerel (see "Fish Consumption Advisories" on page 11). Advisories are posted when one part per million of mercury is detected in fish tissue. Children and women of childbearing age are advised not to eat any of these fish from the posted waters. The consumption advisory on bowfin is statewide. As for king mackerel, small fish (under 33 inches) are safe to eat, but larger mackerel (over 39 inches) should not be eaten. Limited consumption is advised for king mackerel between 33 and 39 inches long. In addition to the state advisories, federal officials recommend people limit their consumption of two other saltwater fish found off the Tar Heel coast—swordfish and shark —because they have also been found to have high levels of mercury.

***Warning signs against** eating mercury-tainted fish are becoming an increasingly familiar sight on eastern North Carolina's waterways. During the past decade, North Carolina has issued 11 advisories against eating mercury-tainted fish. Scientists with the N.C. Division of Water Quality (right) now routinely collect fish from the state's waters for mercury testing.*

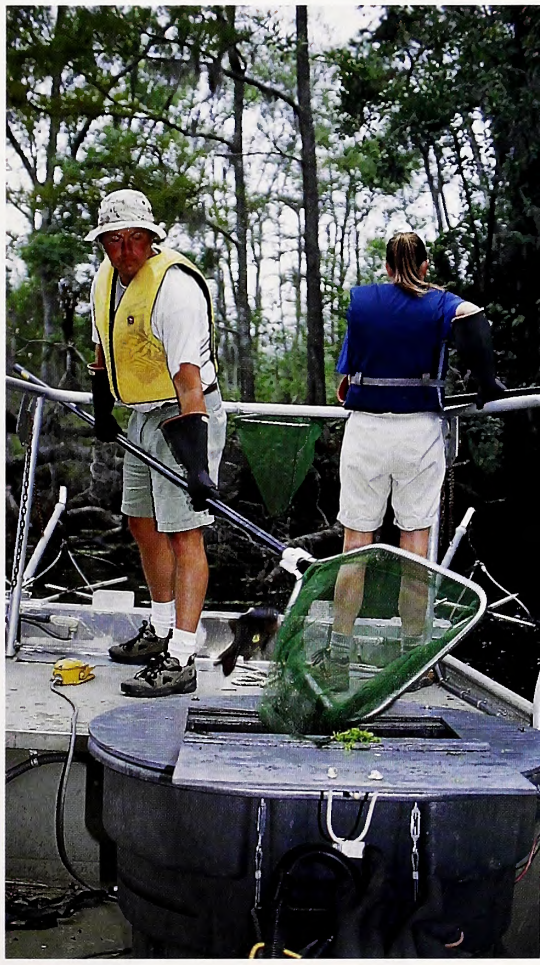
Though high levels of mercury have likely been in these fish populations for decades, if not longer, North Carolina posted its first fish consumption advisory for mercury in 1993 after elevated mercury levels were discovered in three isolated lakes in the Sandhills of Moore County. Additional testing of largemouth bass and bowfin revealed high mercury levels in these species throughout the Lumber River basin. Some of the highest mercury levels were found in fish from the Waccamaw River and Big Creek in southeastern North Carolina, prompting state health officials to take a closer look at the people living in the area.

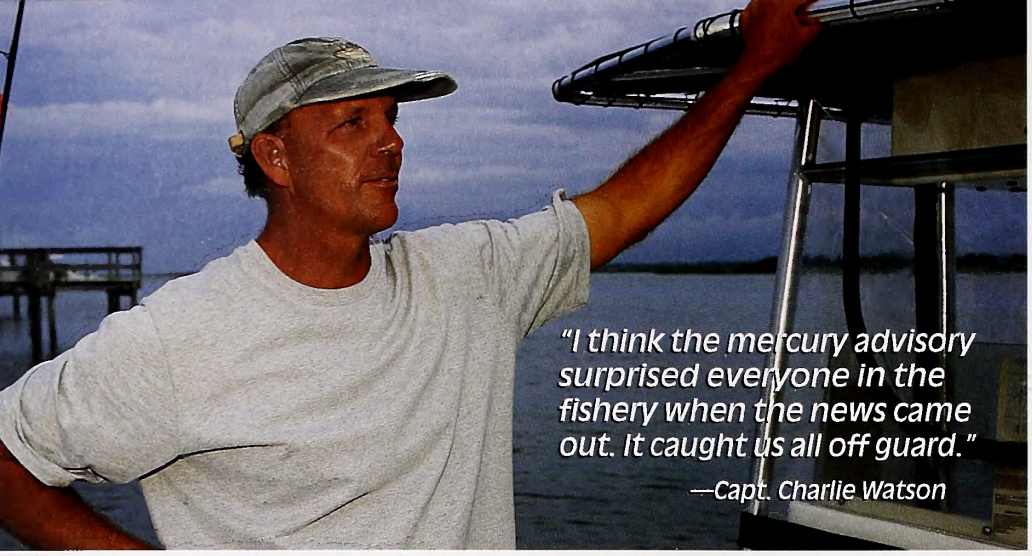
"The Department of Health did test some people living along the Waccamaw River in Brunswick and Columbus counties when the original advisories were first issued," Williams said. The study revealed that people who ate few of the contaminated fish had only trace levels of mercury in their bodies. Conversely, those who ate large amounts of the fish from the river had higher levels of mercury. About 10 percent of the people exceeded the federal Food and Drug Administration's maximum safe threshold for mercury of 10 parts per million. Two of the 70 people tested—both of whom had eaten bowfin often over their entire lives—had hair mercury levels above 30 ppm, believed to be the highest levels of mercury ever recorded in humans in the United States!

The lesson is painfully simple, according to Williams: "If you eat a lot fish with high levels of mercury, you will have higher blood and hair levels of mercury," she said. "This is why we advise people to limit their consumption of fish in these areas."

Though no more testing of humans for mercury has been carried out, the N.C. Division of Water Quality has since the mid-1990s routinely sampled and tested fish from state waters for mercury. Until this year, North Carolina's mercury advisories were confined to waters east of Interstate 95. However, the area was expanded when the state's latest freshwater advisory was issued in February, for the

RODNEY FOUSHEE





South and Black rivers. Wildlife Commission biologists recently finished putting up about a dozen large metal signs, including some in Harnett County, just a few miles from Raleigh, warning of the new consumption advisory.

It seems that the harder scientists look for mercury, the more serious the problem becomes. "The more we look, the more we find," Williams said.

Threat to a Fishery

Within minutes of putting the first cigar minnow overboard, the fluorescent green line is singing off the spool of one of the stout graphite reels. More than a hundred yards of line leaves the reel before the king finally ends its first run and is slowly coaxed back to the boat. The strong fish makes several more runs before it tires and is brought alongside.

"The king mackerel is just a great fish," exclaims Capt. Charlie Watson, as he impales the 30-inch mackerel with the sharp steel gaff and brings it aboard his 22-foot catamaran. "A king hits hard, it is a great fighter and there are plenty of them out there. It is just a wonderful game fish."

Watson, a Topsail Island charter captain, makes his living finding king mackerel and helping his clients put them in the boat. "I think the mercury advisory surprised everyone in the fishery when the news came out," he said. "It caught us all off guard."

The latest mercury warning hurts. "There is no doubt that this is bad publicity," Watson said. "You've got to remember this area has been hit by hurricanes since 1996," he says. "Couple that with this advisory and it does hurt."

Watson says that every day he takes clients out, he has to deal with the specter of mercury. "You have to bring it up to the customer," he said. "But I'd rather them hear it from me. I give them the information and then let them make up their minds about what they want to do when it comes to keeping a big fish."

Subsistence fishermen, who eat large amounts of fish, are clearly at risk from the mercury threat. So is North Carolina's burgeoning recreational fishing industry, which accounts for nearly $1 billion per year. Wildly popular, king mackerel fishing alone represents millions of that total.

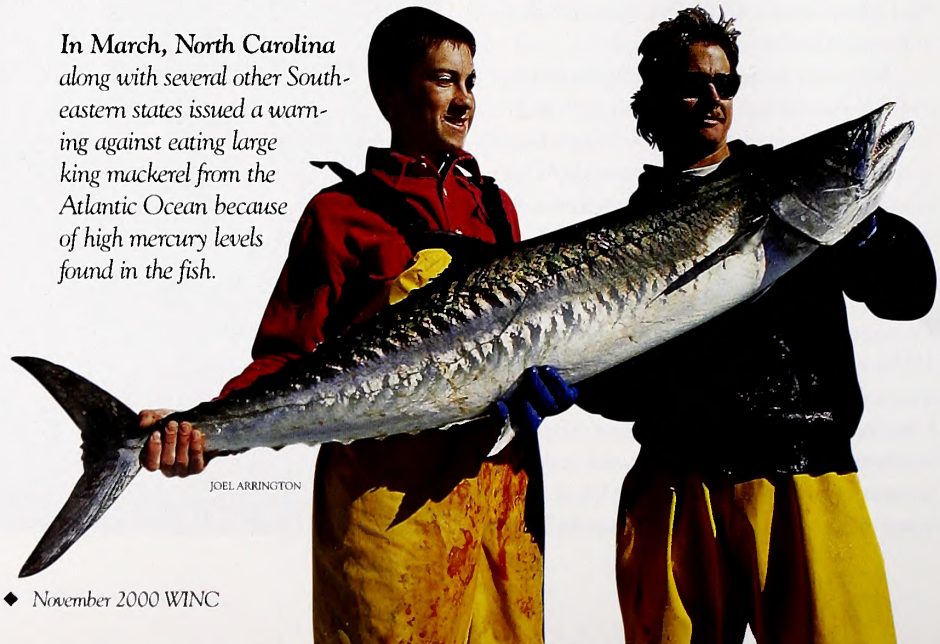
"This mercury situation is sad because the king mackerel has made such a comeback in the past few years," Watson said. "[Fisheries managers] have done so much work to protect the stock to get them back up; the impact of recreational fishing on the economy is huge. Go to Wilmington or Wrightsville Beach and look at the tackle stores now and look what was there five years ago. You'll see how they've grown—a lot of that is from king mackerel fishing. These fish are worth a huge amount to the sport fishery," in fiberglass, outboard motors, gasoline and tackle.

Nelson, the fisheries biologist, echoes the charter captain's concerns. "In addition to the potential health effects, there are also economic and social costs to these mercury advisories," he said. "As fishing, especially by those who want to keep fish, declines in areas with advisories, businesses related directly to fishing such as tackle and bait shops, or indirectly, like campgrounds and motels, are likely to suffer."

Also, advisories may affect subsistence anglers who depend on wild fish for food, Nelson explains. There are a significant number of these anglers in eastern North Carolina.

Though most North Carolina fish are perfectly safe to eat, advisories can have another negative impact on fisheries, Nelson added. "The perception that 'some fish are unsafe to eat' can lead to the perception that 'no fish are safe to eat,'" he said.

In fact, the health benefits of eating fresh fish—an excellent source of low-fat protein—have been well documented for years. So, by choosing other foods to avoid fish, people may actually be hurting their health. Watson, the charter captain, puts it more plainly. "If you think eating fish—even with mercury—is bad for you, eat a bunch of fast food instead," he said. "See where you are 30 years from now. I'll take my chances eating king mackerel!"



In March, North Carolina along with several other Southeastern states issued a warning against eating large king mackerel from the Atlantic Ocean because of high mercury levels found in the fish.

JOEL ARRINGTON

Mercury Sources

The dangers of mercury in the environment are becoming quite clear, but where does it come from?

Most mercury, both worldwide and in North Carolina, is released as vapor into the air and falls back to Earth mixed with rain and snow and as dry particles through the process of atmospheric deposition, explains Jeff Hayward, a toxicologist with the N.C. Division of Air Quality. Mercury has many sources, and occurs naturally in the Earth's

crust. Nearly all soils and rock contain trace amounts, and about half of the releases of mercury worldwide come from natural sources, including volcanoes, forest fires and degassing of the Earth's crust deep below the oceans. Mercury cannot be created or destroyed; however, humans have accelerated the release of mercury into the environment through industrial processes, including the burning of fossil fuels that contain mercury, the burning of mercury-containing waste, certain manufacturing processes and smelting ore.

"It is clear that over the past 150 years, since the beginning of the Industrial Revolution, there has been an increased movement (mobilization) of mercury into the atmosphere," Hayward said. "We've seen a movement of mercury from sources locked up deep in the Earth's crust to living systems. Ultimately, it ends up in the fish."

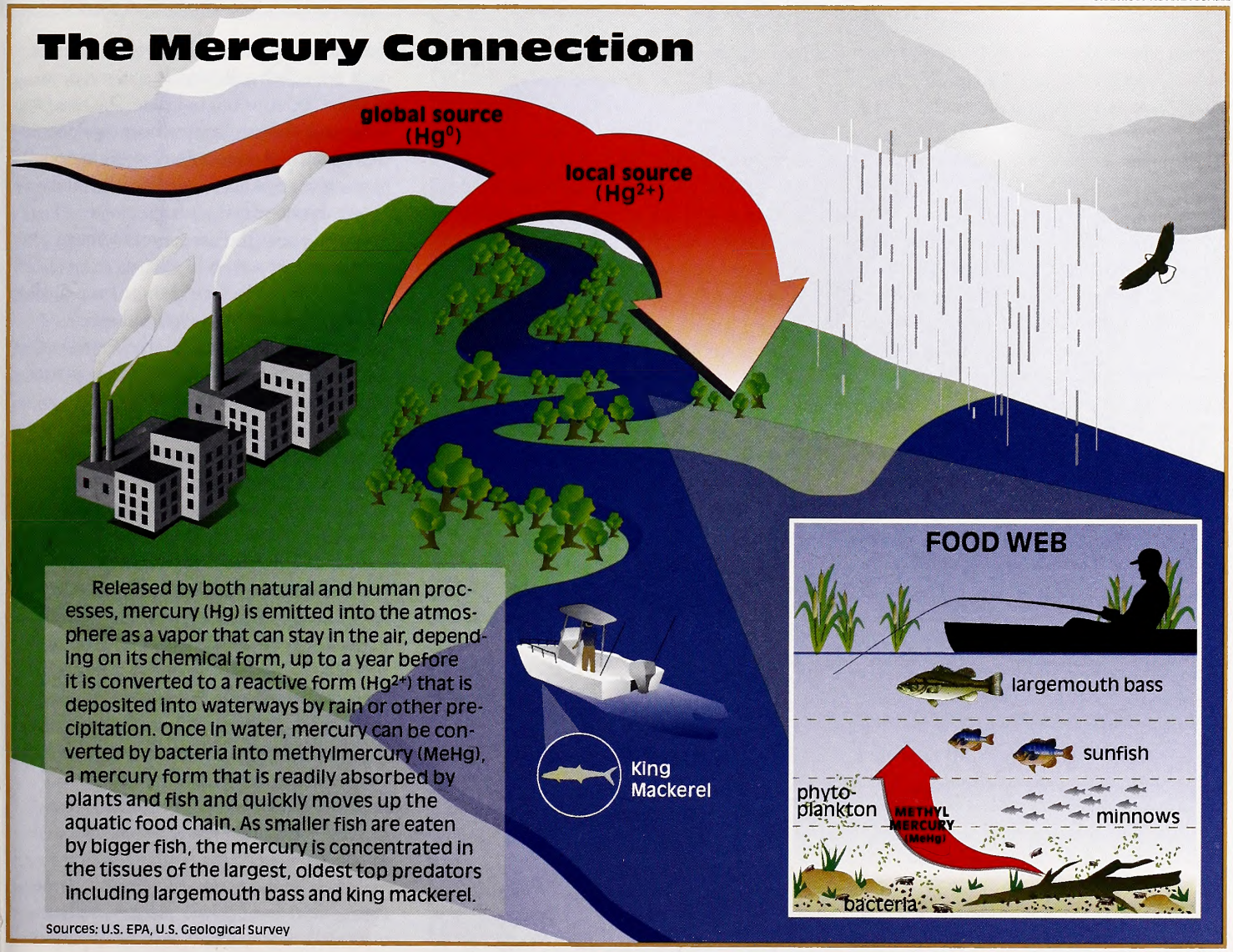
In the United States, as well as in North Carolina, coal-fired power plants are the largest source of mercury emissions in the air, accounting for about one-third of the total man-made mercury emissions. Medical and municipal waste incinerators, which burn waste containing mercury, are also major sources, as well as certain chemical manufacturing plants that use mercury.

In 1998, according to state figures, 50 sources accounted for 97 percent of the mercury released in North Carolina, spewing about 11,000 pounds of the heavy metal into the air per year. Coal-fired plants operated by Carolina Power & Light Co. and Duke Energy represent the majority of the sources, holding 14 of the top 20 spots for North Carolina mercury emitters. At the top of the list is Carolina Power & Light Co.'s Roxboro plant—the nation's tenth largest power plant, providing electricity for more than 2 million customers in North Carolina. The coal-burning plant, located in the northern Piedmont, releases 1,696 pounds of mercury into the air each year.

"Mercury is a global problem," explains Chuck Wakild, supervisor of CP&L's environmental air programs. "On a global basis, U.S. utilities contribute about 1 percent of total mercury emissions. On a global basis, this is pretty small, but on a regional basis, when you look at statewide, man-made sources, it becomes a major source."

Yet local sources of mercury may have an impact on sensitive environments such as those in eastern North Carolina. As evidence, consider the two stations that the state Division of Air Quality maintains in eastern North Carolina to monitor mercury levels in rainwater as part of a national mercury deposition network. The sites, which are very similar, are located in remote areas at Lake Waccamaw in Columbus County and Lake Phelps in Washington County. "What we see, year after year, is that the concentration of mercury in rainwater at Lake Waccamaw

GRAPHIC BY VICTORIA CUMBEE



***Though coal-fired** power plants such as CP&L's Sutton Steam Plant near Wilmington (right) represent the largest source of mercury emissions in the United States, the plants are essentially unregulated for mercury. Meanwhile, state scientists, including Janet Hayes (above) with the Division of Water Quality, continue to test fish tissue for mercury.*

exceeds that at Lake Phelps," Hayward said. "As it turns out, the Waccamaw site has a greater density of mercury emission sources in its vicinity than Phelps. These data are consistent with a greater impact from local sources on rainwater concentrations of mercury in eastern North Carolina." This has serious implications when you consider that half of the major sources of mercury in North Carolina are located east of Interstate 95.

One of the potential local sources of the elevated mercury readings at the Waccamaw station was a chlor-alkali plant operated by Holtrachem, a manufacturer of chlorine, in Riegelwood. In 1998, the plant ranked second among mercury sources in the state, emitting 1,276 pounds of mercury a year. After setting up very sensitive instruments that measure mercury in the air, state scientists discovered a strong plume of mercury vapor at the Lake Waccamaw site that pointed upwind in the direction of the plant some 18 miles away. More compelling, when Holtrachem voluntarily switched over to a non-mercury process in the spring of 1999, the mercury readings at the monitoring site immediately fell off. Most telling, the maximum readings, that once fluctuated widely, fell to just 1/10 of the level they had been when the plant was using mercury cells to make chlorine. "We've seen nearly baseline conditions ever since at Lake Waccamaw," Hayward said. "It is very clear that this plant served as a major local source of mercury emissions in southeastern North Carolina. Whether or not you buy into the local or global theory of mercury deposition, removing all of this mercury and removing it in one of the most sensitive areas of the state is a wonderful thing for the environment. You've turned off a major source of mercury just like that."

Wakild, the CP&L spokesman, dismisses the local deposition theory. "A power plant near low-pH waters doesn't have anything to do with the deposition of mercury," he said. "That's more of an atmospheric process and it is coincidental. The linkage from a source to the mercury found in fish is hard to make. It is impossible to make."

Fixing the Problem

The debate over local versus global sources of mercury can amount to fingerpointing and can be counterproductive. Reducing mercury emissions is clearly the solution to the problem.

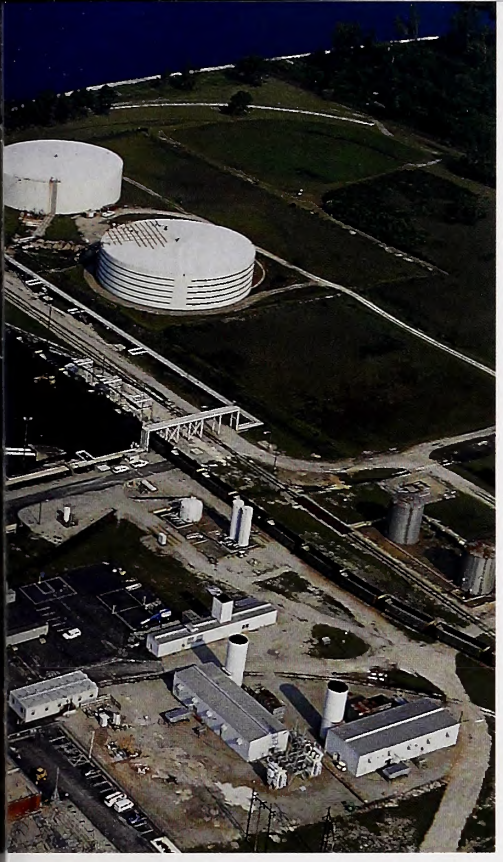
"We could spend a lot of time studying and debating the local versus global impacts of mercury," Hayward said. "We clearly have a problem—there is more compelling evidence in the case of mercury, when you look at the mercury we've already found in the fish and people in North Carolina, than of most any other pollutant. It is detrimental to argue about who is to blame. We need to move past that and try to encourage people to reduce their mercury emissions, especially in sensitive areas like eastern North Carolina."

At the same time, people need to be informed about the dangers of mercury. One of the quickest ways is to tell fishermen about this problem, and advise them to keep smaller fish and avoid eating the posted species.

"We could remove all of the sources of mercury out there—all the power plants, trash burners—and there will still be a lot of mercury in the fish for five, 10 years or more," Hayward said. "We have to be more proactive. It is one thing to put up signs, it is another to get out there with the people who fish these waters every day and tell them about the problem."

As the widespread impacts of mercury have become clearer over the past decade, industries in the United States and other parts of the world have begun to reduce their use of mercury. Alternative processes in the manufacturing of batteries and chlorine have reduced the use of mercury. And strict federal regulations passed in 1995 will reduce mercury emissions from medical waste and municipal waste incinerators by 90 percent.

However, the nation's top source of mercury—coal-fired power plants—remains essentially unregulated with no emission



standards when it comes to mercury. Thirty years after the passage of the Clean Air Act, this may soon change.

At the constant prodding of environmental groups and state agencies, the federal Environmental Protection Agency is considering regulating utility companies for mercury emissions. After studying the problem for nearly a decade, the EPA must issue a decision by Dec. 15.

Many environmentalists and scientists believe the EPA will finally regulate mercury emissions from power plants. Meanwhile, a statewide Mercury Task Force, composed of environmental scientists and health officials, was established two years ago to study the impacts of mercury in North Carolina. The task force may make recommendations later this year on ways to further reduce mercury emissions in the state.

"This is a serious problem for our state," said Williams, the state health official and a member of the task force. "In order to protect our fishing resources and human health, measures should be taken to decrease the levels of mercury that are being released, especially from these major sources."

By reducing our emissions of mercury, hopefully someday the metal warning signs will finally come down from North Carolina's waters. And Rachel Carson will have been wrong, after all, about our destructive nature. You can bet she'd like to have been mistaken about this one. ⊠

Fish Consumption Advisories

Below is a list of the current consumption advisories for North Carolina waters that contain fish (species listed) with high mercury levels:

- **Pages Lake, Pit Links and Watson Lake (Moore Co.)**
- **Ledbetter Lake (Richmond Co.)**

  Largemouth bass— No consumption by women of childbearing age and children. No more than two meals per month for the general population.

- **Big Creek (Columbus Co.)**
- **Waccamaw River (Columbus and Brunswick counties)**
- **Lumber River Basin (Moore, Hoke, Scotland, Richmond, Robeson, Bladen, Columbus and Brunswick counties)**
- **Phelps Lake (Washington and Tyrrell counties)**

  Largemouth bass and bowfin (blackfish)— No consumption by women of childbearing age and children. No more than two meals per month for the general population.

- **Black Lake *(Bay Tree Lake)* (Bladen Co.)**

  Largemouth bass and bowfin (blackfish)— No consumption.

- **South River (Harnett, Sampson, Cumberland and Bladen counties) and downsream of South River at the lower part of Black River (Sampson, Bladen and Pender counties)**

  Largemouth bass and bowfin and chain pickerel— No consumption by women of childbearing age and children. No more than two meals per month for the general population.

- **STATEWIDE**

  Bowfin (blackfish) — No consumption by women of childbearing age, pregnant women and children. No more than two meals per month for the general population.

- **STATEWIDE (Atlantic Ocean)**

  King mackerel — King mackerel larger than 39 inches should not be consumed. King mackerel less than 33 inches are safe to eat. People should limit their consumption of 33- to 39-inch fish. Children 12 and younger and women of childbearing age should eat no more than one 8-ounce portion per month. All other adults should eat no more than four 8-ounce portions per month.

RODNEY FOUSHEE

high-country HUNTING

With the right equipment and a pair of strong legs, you'll find some big bucks in our North Carolina mountains.

written by H. Lea Lawrence ©2000

F. EUGENE HESTER

Somehow, the uphill climb seemed much steeper than I remembered it, but I figured it was just another reminder of how time takes its toll.

Also, that particular memory was of a grouse hunt, and even though I had made every effort to pare my gear down to the barest minimum for a backcountry deer hunt, I was still carrying a heavier load than before. The rifle I carried weighed more than the light 20-gauge over-and-under I use for grouse. In addition, I was carrying water, a lunch, emergency items and the things I'd need in the event my foray was successful.

The backpack was large enough to handle a good quantity of meat. Bagging a deer in mountain country a good distance from any road means that you have the option of trying to drag the animal out, or boning out the venison and carrying it out, along with the rack, of course. The remnants left behind are always cleaned up by varmints and buzzards. Nothing goes to waste in the woods.

I enjoy hunting alone, so I always make sure someone knows where I'll be. This is particularly important when I'm in remote areas, in which case I supply them with a

***If you're looking for** an experience akin to high-country hunting out west, look no farther than the mountains of North Carolina. These areas are remote and sometimes difficult to reach, but usually have less hunting pressure and older bucks.*

F. EUGENE HESTER

topographical map marked with my route of travel and let them know when I expect to be back home. If I don't show up or call at an appointed time, the situation can be checked out. When in such places, I'm equipped with things essential for survival: emergency blanket, waterproof match case, candles, fire starter, first aid kit, flashlight, whistle, strobe-signaling device, some high-energy food bars and a wireless telephone.

I guessed dawn was still nearly 30 minutes away, but a clear sky and a bright December half-moon provided enough illumination to make my small flashlight practically unnecessary. Within 15 minutes, I reached the top of the ridge, paused for a few moments to catch my breath, then proceeded on. I had a quarter-mile walk along the spine of the hogback to the spot where I wanted to set up. It overlooked a gap where there was a heavily used deer trail. My earlier observation indicated that the deer came up the little valleys on each side, then proceeded up the ridge lines in either direction they chose. From my vantage point, the animals would be moving either toward or away. The former would afford a shot over whatever distance I let the deer approach; the latter could mean shooting at distances between 125 and 150 yards, easy range for my .284 Winchester.

The only sound as I moved along was the crunch of my boots on the frosty leaves. At one point, I caught a glimpse of the dark silhouette of a silently departing owl. A minute or so later I heard its eerie call as it established a different location. I felt a slight breeze building, but it was in my face, which wouldn't pose a problem.

I reached my destination and began checking around for a spot to sit. A fallen log that lay diagonally across the hillside in front of me got my attention. Seated behind it, I would have a solid rest if a long shot was required. I didn't look farther. I leaned the rifle against the log, got my binoculars out of my jacket pocket and began scanning the area. The waning moonlight and waxing illumination of dawn provided enough light to see clearly.

***A few top western** game lands to locate bucks like the one at left are: Green River Game Land in Henderson and Polk counties; the portion of Pisgah Game Land in Mitchell and Yancey counties; and the portion of South Mountains Game Land in Rutherford County.*

"However, in mountain counties that offer backcountry deer hunting, the vast majority of deer taken each year are bucks. The reason is obvious. Both the Pisgah and Nantahala forests lie mostly on land that requires more than the average amount of physical exertion to hunt. If deer have to be packed out, most hunters will usually shoot only bucks with large racks."

I felt good about my prospects. On three recent grouse hunts in the area I'd seen big bucks, one of which was a 10-pointer. I figured it was likely that none of these deer were "hunter-oriented," which had given me plenty of incentive to put a hunt on the season's schedule. Now it was simply a matter of determining whether it would pay off.

The highland environment changes far less than that in the lowlands, where development is rapidly swallowing up habitat. In the mountains, you can still find virtually unspoiled places for a variety of activities in addition to deer hunting: grouse hunting, squirrel hunting, trout fishing or just plain walking around.

I was aware that I might strike out. The deer herds in the mountains are much smaller than in the other parts of the state. So if putting venison in the freezer was my principal reason for hunting, both the Piedmont and Coastal areas would be far better bets than the Mountains.

However, in mountain counties that offer backcountry deer hunting, the vast majority of deer taken each year are bucks. The reason is obvious. Both the Pisgah and Nantahala national forests lie mostly on land that requires more than the average amount of physical exertion to hunt. If deer have to be packed out, most hunters will usually shoot only bucks with large racks. In the Piedmont and Coastal Plain, getting to a selected hunting spot requires little more than a casual stroll from the car or other vehicle. So hunters can be less choosy.

The reason hillbilly bucks are special is that though there are fewer of them than in other parts of the state, the chances of bagging one are fairly good. Something else: the lack of hunting pressure permits them to survive longer than bucks in other places, so they typically live longer. In some high-kill locations, bucks older than 2 years are hard to come by, but in remote mountain country, bucks in the 4- to 6-year range aren't uncommon.

I didn't have long to wait before things began to happen. Within less than half an hour, two does appeared in the gap, followed by what were obviously their yearlings. Once on level ground, they all started browsing in the leaves, searching for acorns. Shortly afterward, the first rays of sunlight knifed over the eastern horizon.

When the sun finally appeared and began warming the air, I found myself getting a bit drowsy. The 3 a.m. wake up and uphill climb were taking their toll. Fortunately, I didn't take my eyes off the does, because all at once I saw them becoming a bit restless, milling about slightly and looking back at the trail over which they had come. It was something I'd seen many times before, and it almost always indicates that a buck is in the vicinity.

Seconds later that proved to be true. A nicely antlered buck came trotting onto the scene and stopped about 20 yards short of the does, which seemed ready to bolt at any second. At the same time, I realized I had to make a decision very quickly. While it wasn't anything like the huge buck I'd seen a few years earlier, it still looked pretty impressive. I lowered my head to the scope, slipped off the safety and squeezed the trigger. The buck dropped like it had been struck by lightning, and the does vanished.

Once I walked down into the gap and admired the seven-point rack, the glamorous part of the hunt ended. From then until well past noon, all that was taking place was butchering the meat, caping out the head and making the long and tiring trip back to the car.

It was my only mountain hunt of the year, and the buck wasn't the biggest I took during the season, but it was the most important. Hillbilly bucks are special to me, and if you ever bag one under similar circumstances, you'll know why! ⊠

H. LEA LAWRENCE

***Because backcountry** hunting is usually done far from roads or access areas, hunters must pack harvested deer over considerable distances. Be sure to carry along plastic bags, a good skinning knife and a portable meat saw.*

Living on Hope

Buffeted by hurricanes and by the stormtides of history, the Ca'e Bankers of Harkers Island have used their native skills to survive.

written by Carmine Prioli ©2000

photographed by Melissa McGaw

IN 1987 THE WOMEN OF HARKERS ISLAND United Methodist Church assembled a cookbook that contains a recipe for "Harkers Island Turkey (Loon)." Of course, the loon enjoys federal protection as a nongame species, so the recipe was included merely to recall the times when islanders captured loons for food and for their leg bones, which provided excellent lures for hooking Spanish mackerel. A tough bird no matter how you attracted, killed or cooked it, the loon had a resilience and resourcefulness that made it the subject of island folktales. Like the indestructible gray goose of African American folklore, the Harkers Island loon showed a cunning ability to outwit its pursuer. Its physical strength, mental agility, its very "looniness" in the face of danger made the bird an apt symbol and alter-ego of its hunters, the so-called "Ca'e Bankers" of Harkers Island.

***Perched between** The Straits and Back Sound, Harkers Island carries its weathered history lightly (facing page). Above, Jamie (left), James (middle) and Houston Lewis (right) of Lewis Boat Works represent two generations of boatbuilders who have helped make the Harkers Island boatbuilding reputation.*

The term is a local contraction of Cape Lookout and Shackleford Banks (pronounced "kay"). It signifies a special breed of North Carolinians, men and women, whose ancestors lived, fished and harpooned whales upon a cherished seascape that has defined and spiritually nourished them for more than 300 years.

Many of the original Bankers were probably 17th-century Englishmen from the Virginia Tidewater region. Others who came later were colonial New Englanders induced to settle on the North Carolina coast by the Lords Proprietors. County records indicate that in 1726, Samuel, Ephraim and Ebenezer Chadwick and John Burnap, all "late of New England, now of Carteret Precinct," came south to take whales. But these individuals and others like them were not only whalers. They were skilled harvesters of the many available varieties of fish and shellfish. Necessity also demanded that they be masters of several trades, including boat building and house building, farming and hunting. Most of all, they possessed a Yankee ingenuity characteristic of their Puritan ancestors. They had sharp business instincts and, especially, a talent for land speculation. One of them, Ebenezer Harker, called himself a "shipwright." But this canny Bostonian, who was second cousin to Ben Franklin, turned handsome profits in land deals that included the 2,400-acre island that bears his name.

KEN TAYLOR

KEN TAYLOR

Many Harkers Islanders *descend from families whose first home in the region was Shackleford Banks (top), in the shadow of Cape Lookout Lighthouse. The lighthouse's diamond pattern is still visible today from Harkers Island's distant shore. Before Shackleford Banks was made a part of Cape Lookout National Seashore, islanders annually drove herds of wild island horses into cedar pens for branding (above).*

Despite the popular attention that has been directed to North Carolina whaling, that fishery provided only a supplemental income to local families. In fact, Banker families living in Shackleford communities with names like Diamond City (for the diagonal checkers of the Cape Lookout Lighthouse), Wade's Shore and Cape Hills had long survived on earnings from less hazardous and more predictable fisheries. Commodities such as salted mullet were used to barter for items such as flour and coffee that the Bankers could not produce themselves, but most of their basic necessities were harvested locally from gardens and the surrounding ocean and sounds. Residents adapted local materials to serve a variety of needs: homes were constructed from native timber and lumber salvaged from shipwrecks, and tough patches of sharkskin or porpoise hide became door and window hinges. Women scrubbed floors with beach sand; mattresses were padded with seaweed; conch shells brimming with whale oil served as lamps; reeds and grasses were woven into baskets; sheep's wool snagged on briers was collected by children and woven to make socks. By all accounts, life on Shackleford Banks approaching the turn of the century was as independent and as self-reliant as any that had been seen in frontier America.

In the late 1890s, however, a series of powerful storms swept over the North Carolina coast, bringing with them salt water that saturated gardens and, more ominously, eroded oceanside dunes that protected soundside communities. The Bankers had withstood many storms over the years, including ferocious hurricanes in 1878 and 1879 that had already begun to affect Shackleford's natural environment. But the 1890s saw "monster" storms, hurricanes of a force usually experienced only once or twice in a generation. These storms came within a few years of each other and they were merely nature's preparation for the big one—the San Ciriaco Hurricane—that hit on Aug. 17, 1899. This was the storm that sealed the fate of every human community on Shackleford. It washed away nearly all of the protective dunes, leaving houses, gardens, people and livestock essentially unprotected from the winds and surges of future storms, even those of far less intensity.

When it was over, Shackleford's gardens and most of its rich topsoil had been washed away. Freshwater wells dried up. Houses were blown off their foundations or shattered entirely, and the beach was cut so low that areas formerly protected from ocean waters were drowned in overwash. Bodies of sheep and cattle floated in the sound. Coffins and ancestral bones poked out of the sands of local cemeteries.

The damage caused by the August 1899 storm was further increased by another storm that hit in October of that year. But by that time, most of the residents of the Banks had already found refuge across Back Sound.

Born in 1882, *Stacy F. Guthrie (right) spent a life as a fisherman and boatbuilder like so many islanders before and after him. In the 1930s, Harkers Island workboats began to carry a flared bow that derived from a design by boatbuilder Brady Lewis. This high-powered cruiser (below) shows off the innovative design.*

COURTESY OF CORE SOUND WATERFOWL MUSEUM

CARMINE PRIOLI

Many disassembled the remnants of their wooden houses and rebuilt them on mainland locations. In some instances, houses were placed on a pair of skiffs and towed to Harkers Island, where most of the Bankers settled. Others went to Salter Path and Morehead City, where, tradition has it, local residents disparagingly compared the ragtag emigrants to biblical wanderers. Devout Christians for the most part, the Bankers saw the aptness of the metaphor, and today their descendants proudly refer to their neighborhood encompassing roughly a five-block area in Morehead City as "the Promised Land." The relocation was no less spiritual than it was geographic, and Bankers still commemorate it in a popular song titled "I Am Bound for the Promised Land."

At certain times during the year, temporary camps were constructed on the Banks for catching and processing fish, particularly mullet. But by the early 1900s, Shackleford's year-round residents consisted only of livestock: cattle, sheep, goats and horses left to graze on the remaining underbrush and salt marsh vegetation. By 1902 the only significant remnant of Diamond City was its wind-ravaged cemetery. The majority of Banker families now lived on Harkers Island, where cheap land was available within sight of the beaches, dunes and marshes of the island that had been their home for a half dozen generations.

"Stirring Memories Remaining Only in the Blood"

In the first half of the 20th century, the displaced Bankers reestablished and further strengthened their island culture, continuing to earn their livelihoods on the water, just as they had done for generations. When the Beaufort ice plant was established in the 1920s, commercial fishing became the mainstay of the island's economy, and it remained a thriving industry well into the 1960s.

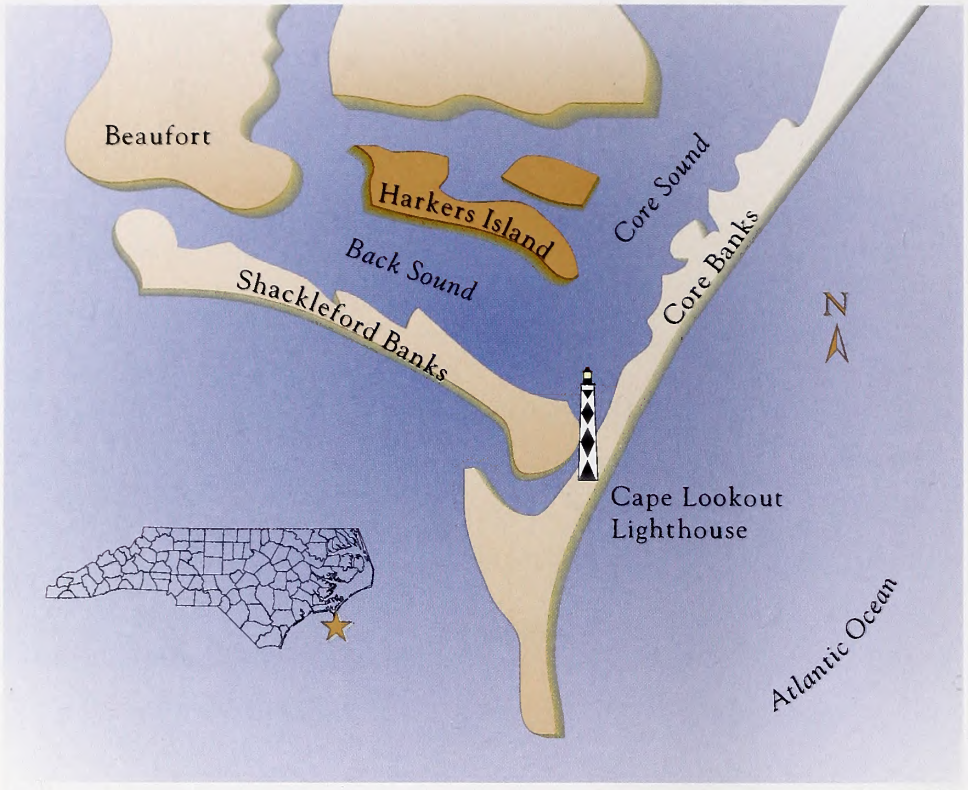
But throughout this time, Shackleford Banks never relinquished its nearly mystic hold on its displaced sons and daughters. In fact, the emotional and spiritual ties between the Ca'e Bankers and Shackleford deepened as time passed and as stories of the lifestyle and character of the old residents were told and retold, moving quickly into the realms of legend and poetry.

For years, descendants of the original Bankers returned periodically to Shackleford to live in summer camps from which they fished, "stomped" for clams and tended livestock. Each July 4 they fanned out over the island, driving herds of wild horses into cedar pens to rope and brand colts and fillies born during the previous year. In 1985 Shackleford Banks became part of the Cape Lookout National Seashore, which meant that all evidence of human habitation needed to be removed. Even temporary residence on Shackleford was no longer possible, but in almost ritualistic fashion and with a determination only heightened by time, the Bankers still return in skiffs and houseboats. They come, as Captain Josiah Bailey tirelessly instructed all inquisitive "foreigners" (anyone from the mainland), to live "off nature's abundance, relishing the isolation, the primitiveness; stirring memories remaining only in the blood...to tend the totems over their sacred ground, and in so doing, to renew their spirit."

Brady Lewis and the Flare Bow

For most of the first quarter of the 20th century, boat builders on Harkers Island catered to local demand for traditional work boats. In the 1930s, however, two events occurred that eventually led to calls for island boats that originated far beyond the Down East region. The first event was the arrival around 1935 of Brady Lewis. Originally from Salter Path, Lewis moved to Harkers Island and soon became known throughout the region as the man who gave the sturdy Harkers Island workboat a feature known as the flare, or flowered bow, for the way its inward curves resemble flower petals in full bloom.

But had it not been for the second event —the arrival of electricity in 1939—Harkers Island and Brady Lewis may never have become widely heralded for the design and standard of quality that have become legendary. Electricity enabled the use of power tools for the first time on the island. The complex cut of the curved bow frames, the ripping of juniper boards into ¾-inch strips for planking,



MAP BY KIMBERLY K.C. SCHOTT

***Fisherman Eddie Willis** mends his nets while his mother Dora Willis helps. Islanders have always lived off the ocean's treasures, although in the last 20 years commercial fishing and boat building have declined in importance.*

and the heavy sanding required to smooth the curve of the flare bow would not have been possible on a large scale without modern electrical equipment. Neither materials nor the basic skiff design changed from those that had been in use for many years. Boats would still be constructed without formal plans by a method known locally as "rack o' the eye." But the end result would be a vessel with lines so fluid that they transformed fishing boats into works of vernacular art, in which sculptural form and utility were joined in a manner rarely possible using only the ancient adz and broadax.

Over time, the formula for a Lewis boat became standardized and so well known that other island builders had no trouble duplicating it. After all, the construction methods and materials were no different from those used for generations, and the framing—aft of the bow—was basically that of the traditional skiff. The difference was in the flare: to create it, the first rib behind the stem is cut to form a 5-inch deep curve, the second rib is cut 4 1/2 inches, and succeeding ribs are cut with curves 1/2 inch less until they straighten toward the stern.

The uninitiated viewer, accustomed to seeing the often exaggerated flare of modern fiberglass hulls, might wonder about the significance of Lewis's accomplishment. It is a relatively simple process to mold fiberglass to a curved form. But in the days before man-made materials, shaping wood to graceful curves (without the use of steam) required unusual skill and imagination. In addition to the 5-inch curve formula, Lewis constructed the sides of his boats with 3/4-inch strips rather than with planks. The narrow strips were easily fashioned into the compound bend that would, according to one observer, "blow fuses in a contour computer." The finished product offered the streamlined look of fiberglass nearly a quarter century before fiberglass would become the dominant material in boat construction.

Along with the islanders' reputation for building strong, maneuverable boats, the flare bow design became a Harkers Island trademark that attracted the attention of off-island commercial and sport fishermen from New England to Florida. But for more than a generation now, the demand for mass-produced fiberglass hulls has far outstripped the demand for wooden boats. One result is that the number of full-time builders on Harkers Island has dropped from a high of about 20 (in the 1970s) to three: Lewis Brothers, Alec Willis and East Bay Boat Works still specialize in the wooden design that Brady Lewis made famous. They cater to a small but loyal group of commercial and sport fishermen to whom the appeal of wood and traditional craftsmanship remains irresistible.

You Live on Hope More Than You Do on Money

As in so many maritime communities, the last 20 years have seen the decline of commercial fishing as well as boat building

***Leaning in the direction** of the bracing winds that blow in from the sea, Harkers Island live oaks have survived countless storms. Islanders' lives continue to be shaped by the demands of the sea around them.*

on Harkers Island. Of course, this change has been accompanied by an increase in the numbers of tourists, summer vacationers and year-round recreational anglers, including a growing number of saltwater fly-fishermen. There is some local resentment of this fact. But there is also a vibrant pride in the Bankers' past, an unhesitating willingness to proclaim a heritage that was once more in harmony with the ocean's currents and the moon's phases than with—among other things—distant competition from foreign watermen whose shrimp and scallops crowd supermarket freezers and the tables of many local restaurants.

In the face of difficult times ahead, many Ca'e Bankers—like their Shackleford forebears—will continue to defy the odds and fashion their traditional lifestyles to the demands of modern times. A few have turned to model boat building and decoy carving, catering to an insatiable demand from tourists for objects of coastal culture to adorn their landlocked homes and offices. Others still build their own boats, set and repair their own crab pots and pound nets. They will work as long as there are fish and shell-fish in the water and they are able-bodied enough to catch them. "[Last year] we had a good fall," said Eddie Willis, a fifth-generation fisherman. He and his family "stretched it out and we're still surviving." He continued philosophically, saying: "You know, we live from one season to the next, we hope! We hope for a good season and that takes you to the next one...And so you live on hope more than you do on money." ⊠

Carmine Prioli is an English professor at North Carolina State University. This article is adapted from his book, "Hope for a Good Season": The Ca'e Bankers of Harkers Island *(Asheboro, N.C.: Down Home Press, 1998).*

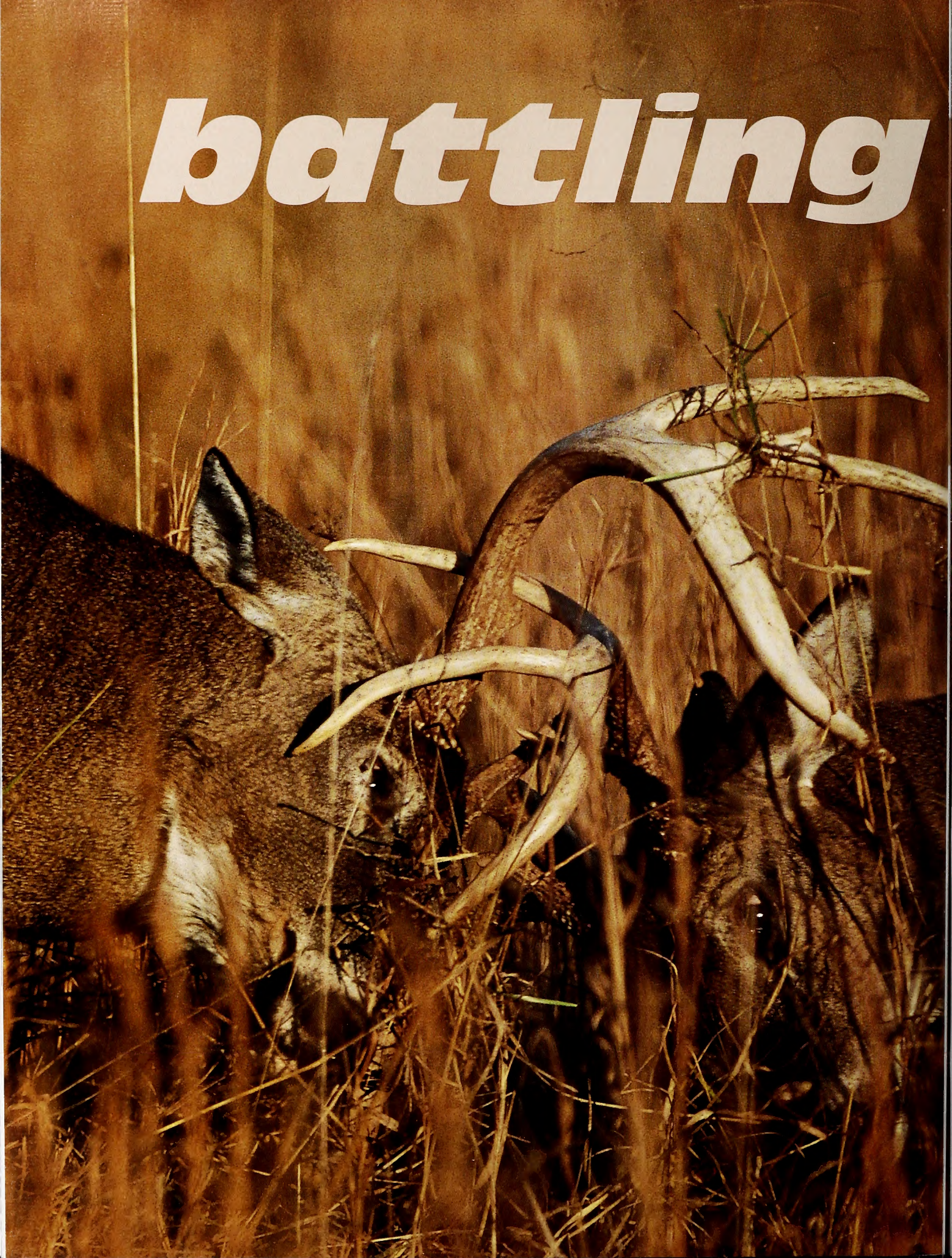
Ca'e Banks Heritage

Sixteen acres of Core Sound maritime forest have been set aside as a place to celebrate and preserve the rich waterfowl heritage of the original Down East, North Carolina. Work is progressing there on a permanent home for the Core Sound Waterfowl Museum. The 20,000-square-foot museum will include exhibits of decoys and decoy carving, commercial fishing, boatbuilding and oral histories of Core Sound's people.

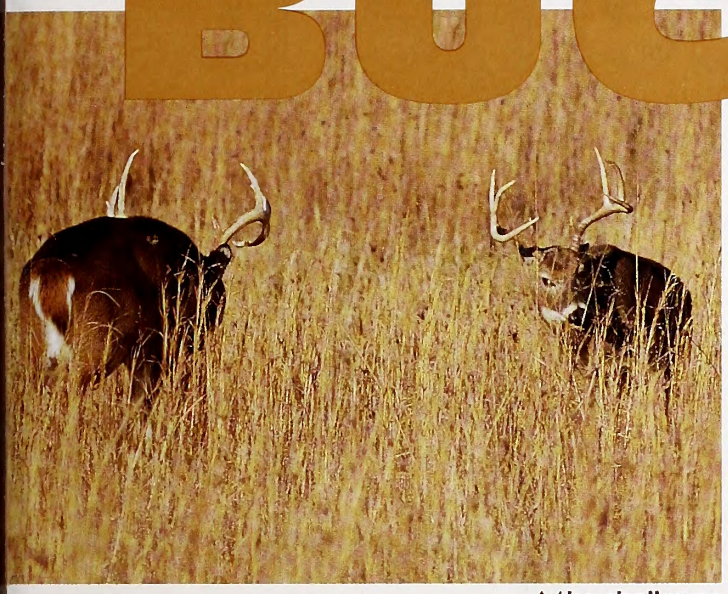
And there's no better time to see it than at the annual Core Sound Waterfowl Weekend, slated for December 2-3 on Harkers Island. This is a heritage celebration for the entire family, a weekend of environmental education, hunting and fishing tra-ditions, and community celebrations. Exhibits and programs include model boats, a duck blind building contest, storytelling, crabpot making, cooking, children's classes, raffles, auctions, food, and decoys, decoys, decoys! Contact the museum for more details at (252) 728-1500, or visit its web site at www.coresound.com/index.html

—T. Edward Nickens

battling



BUCKS



▲ the challenge

Dropping caution to the wind, two rival bucks lay into one another during the rut.

written and photographed by
F. Eugene Hester ©2000

It was one of those once-in-a-lifetime experiences—wildlife action at its best. In an effort to photograph deer, I had climbed a ridge and peered through autumn foliage. As I looked, a doe entered a weed field surrounded by woodland. Following close behind was a magnificent buck. He watched her every move. Suddenly, the buck stopped and stared across the field. In the distance, an equally magnificent rival stared back. A challenge was imminent.

"How lucky can you get?" I thought to myself. I was at the right time and place to see and photograph one of the most exciting behavioral acts of white-tailed deer: two bucks challenging one another for dominance and the opportunity to breed. Though common behavior, it's not frequently observed.

The challenger came directly across the field. As he approached, the two bucks lowered their heads and, with antlers clashing together, they began a vigorous shoving match. It wasn't just sparring—it was an all-out fight. The bucks seemed equally matched. One would push the other 10 or 20 feet, then the other would push him back. They tried to twist with their antlers to throw the other off balance, and briefly one was actually rolled on his side.

▲ the charge

◀ the battle

The struggle was a determined one and lasted perhaps 10 minutes. By the time it was over, they were about 100 feet from where the showdown began. Throughout the struggle they were so intent on defeating each other that they were oblivious to my presence. The fight was so heated that I worried that I had gotten too close and that the winner might look around for something else to whip. Finally one buck emerged the clear winner. The loser wasted no time in running into the woods with the victor in pursuit. ⊠

▼ the retreat

furry enforcement officers

They absolutely love their job, work for free, never complain about holiday duty and—without hesitation—would give their life to protect their partner. Meet the N.C. Wildlife Resources Commission's canines, quietly ushering in a new era of game law enforcement.

written by Chris Powell / photographed by Ken Taylor

N.C. WILDLIFE RESOURCES COMMISSION

***Master Officer** Mike Criscoe poses with "Link," the first canine ever used for wildlife enforcement in North Carolina. In 1986, Criscoe initiated the Wildlife Commission's canine program, now considered the benchmark program by other state wildlife agencies. Master Officer Mike Loukos trains with "Raleigh" (facing page) during a game-detection exercise.*

An elderly coon hunter had been reported missing since the evening before, and Wildlife Enforcement Officer Paul Linder feared hypothermia would find the fellow before he could. A late-winter rain had fallen that morning, washing away all the tracks, and—to make matters worse—dusk was approaching.

Accompanied by an emergency medical technician, Linder and his canine partner "Niko" quickly located the hunter's truck and began searching a nearby firebreak flooded knee-deep in water. With only flashlights to guide them, walking became difficult and the medical technician stepped into a deep area of black mud. After hauling himself out, he needed a pause to catch his breath. However, the officer and canine continued to push ahead. After traveling some distance, Linder let out three yells, and a cry for help came back in response. Niko, using his keen sense of hearing, locked onto the location of the distress call and began pulling harder against his lead as the two continued down the firebreak.

By the sound of the distress calls, Linder could tell he was only a few hundred yards from a successful rescue. But what the officer didn't realize was that he was just mere feet from peril. The two approached a 12-foot-wide stream that appeared shallow enough to ford. Seeing no other way around, Linder decided to cross.

"As soon as I stepped into the water, I realized it was a mistake," he said. "I sank into a bog and, in just seconds, the mud was up to my thighs. I struggled but just sank deeper, and the water was rushing over my chest and moving higher. I gripped the lead and gave Niko the apprehension command."

The powerful German Shepherd began lunging toward the direction of the hunter, dragging Linder to safety. Once free, the offficer immediately gave Niko the stand down command, then collected himself. A National Guard helicopter was soon called in and, using Linder's location, found the victim in its spotlight. At 2:30 a.m. the hunter—wet, tired and nearing hypothermia—was airlifted to safety.

For his role in saving Officer Linder's life and completing the rescue, Niko received the U.S. Police Canine Association's Meritorious Award for Valor. From Officer Linder, Niko received his deepest gratitude. "I would have drowned in that bog if Niko had not been there," Linder said, reflecting later on the rescue. "I have replayed that night numerous times in my head, and I believe in my heart that Niko knew I was in trouble. He saved my life."

Niko's actions that day epitomized the reason canines have found a home in wildlife law enforcement. Started as a pilot program with the N.C. Wildlife Resources Commission in the late 1980s, these black-and-tan officers are trained to accomplish three primary tasks: protect their handler, track lost or suspect individuals and sniff out illegal game or evidence.

Using canines in this capacity was the brainchild of Master Officer Mike Criscoe, who was a canine handler in the military before joining the Wildlife Commission. German shepherds have a long history of law enforcement and combat duty. They sniffed out bunkers in World War II, and often walked point with their handlers in Vietnam, alerting them to trip wires and landmines. Criscoe believed that canines, if trained properly, could also provide a safer, more efficient working environment for wildlife officers. "I used to be in the military police overseas, and we had canines over there," Criscoe said. "I thought, why not use that concept to enforce the hunting and fishing laws here in North Carolina."

Wildlife *Enforcement Officer Mike Owens and canine "Buddy" (below) perform a training exercise that involves the use of corn as bait. During another simulation, Beau stands guard while an officer checks a suspect for concealed weapons.*

"When the soybeans stopped moving we went to that spot, and Beau had picked the guy's gun up and was trying to drag it out of the field."

In 1986, Criscoe purchased canine "Link," who was trained with an emphasis on tracking, handler protection, apprehension, suspect and article search, and search and recovery. Two years later, the team began working in the field, achieving immediate successes by finding lost children, locating hidden weapons and making numerous arrests. Such was his notoriety, that Link achieved somewhat of a celebrity status, earning mention in national publications such as *Field and Stream* as well as *Sports Afield*.

Wildlife officers often work alone and in remote locations. But with a canine at his side, Criscoe found he always had backup. And the cost of putting this extra "man" in the field averaged just a few dollars a day. The pilot program with Link was so well received, the Wildlife Commission expanded the use of canine enforcement in 1996. Criscoe now oversees 10 teams spread throughout the state, and he attributes the program's success to support received from sportsmen and the Wildlife Commission.

"We are only able to excel because of the 100 percent support we receive not only from the sporting community, but also from our fellow officers and the chain of command," he said.

Originally, German shepherds were acquired through donations or from animal shelters. Recently, however, canines have been purchased from Holland, because the breed tends not to develop hip problems as they age, like their domestic counterparts. The furry imports cost $3,000 a piece and come with some preliminary training.

Canines can be taught specifically to find missing persons, detect drugs, do guard duty and much more. But instead of focussing on one task, the Wildlife Commission's canines are trained to be multifunctional. They must be able to perform article search, game detection, tracking and backtracking as well as apprehension. And each is brought up in a strict, yet non-aggressive atmosphere. Think of a cross between a bloodhound, a St. Bernard, some Doberman pinscher and a lot of Labrador retriever.

"Our canines are social and friendly," said Wildlife Officer Gordon Hobbs, who recently joined the canine unit. "You can let adults and kids come up and pet them. In training, our canines can be commanded to apprehend a fellow officer, then after the training session is over, the same officer can walk over and pet the canine. It's all a game to them; they never take anything personally or hold animosity."

Intense training has been the key element to the program's success. As with a weapon, a handler must certify with his four-legged partner each year to demonstrate complete control during a number of tasks. The canine must be able to obey voice and hand signals, heel and stay commands and negotiate obstacle courses. One of the most impressive drills is apprehension training. Posing as a suspect, a fellow officer will flee and the canine is ordered to apprehend. Sometimes the canine is allowed to follow through; other times he must be called off midway into the chase. This training simulates a suspect who flees, then gives up after the canine is in pursuit. "You can call back a canine, but you can't call back a bullet," said Mike Owens, a handler since 1996.

In addition to the Wildlife Commission's own strict certification criteria, the teams also certify each year at the U.S. Police Canine Association (USPCA) competitions. This event matches the Wildlife Commission's canines against some of the best-trained canines teams in the country. "These canines will meet our standards, but we are not satisfied with just those standards," Criscoe said. "The USPCA is like the Olympics. It is one of the highest standards a canine can meet." During the past four USPCA

certifications, the Wildlife Commission's canine teams have twice placed first, with one third-place and one fourth-place finish. Their exceptionally high level of training has also paid off with a canine program that has become widely respected by the public. To date, there has never been a complaint filed against a Wildlife Commission canine.

Officer Criscoe said his canine partner has helped calm tensions in confrontational situations that would have likely turned out much worse. Once while checking a squirrel hunter, Criscoe said, he noticed the person wasn't wearing blaze orange—a relatively minor offense. When Criscoe approached, the fellow went into a tirade. "He started coming toward me, threatening to fight me there on the spot," Criscoe said. "Of course, he hadn't seen the canine yet. But when he saw Link, he calmed right down. When I asked him what provoked such anger, he said he was a truck driver and had received two speeding tickets that week. He had gone squirrel hunting to unwind and when he saw an enforcement officer, he just snapped. He proceeded to tell me that the dog's presence stopped him from assaulting an officer and getting in real trouble."

On other occasions the canines have been able to assist people in need. Wildlife Officer Tony Pennell, who has been with the unit since 1996, said his partner "Beau" helped find a shotgun misplaced by a hunter. "We came across a guy dove hunting who, in the process of looking for a dove, had laid his gun down in a soybean field and couldn't relocate it," Pennell said. "I sent Beau in, and it was so thick all we could see were the soybeans moving where the dog was walking. When the soybeans stopped moving we went to that spot, and Beau had picked the guy's gun up and was trying to drag it out of the field."

Last year, Officer Owens received the N.C. Bowhunters Association's Officer of the Year award for his enforcement duties during bow season. "I received a call about some trespassing during bow season, and I went up to the location, found the vehicles, put the canine out and started tracking," Owens said. "When everyone was rounded up, I cited seven individuals for using firearms during bow season. We also seized several guns and treestands."

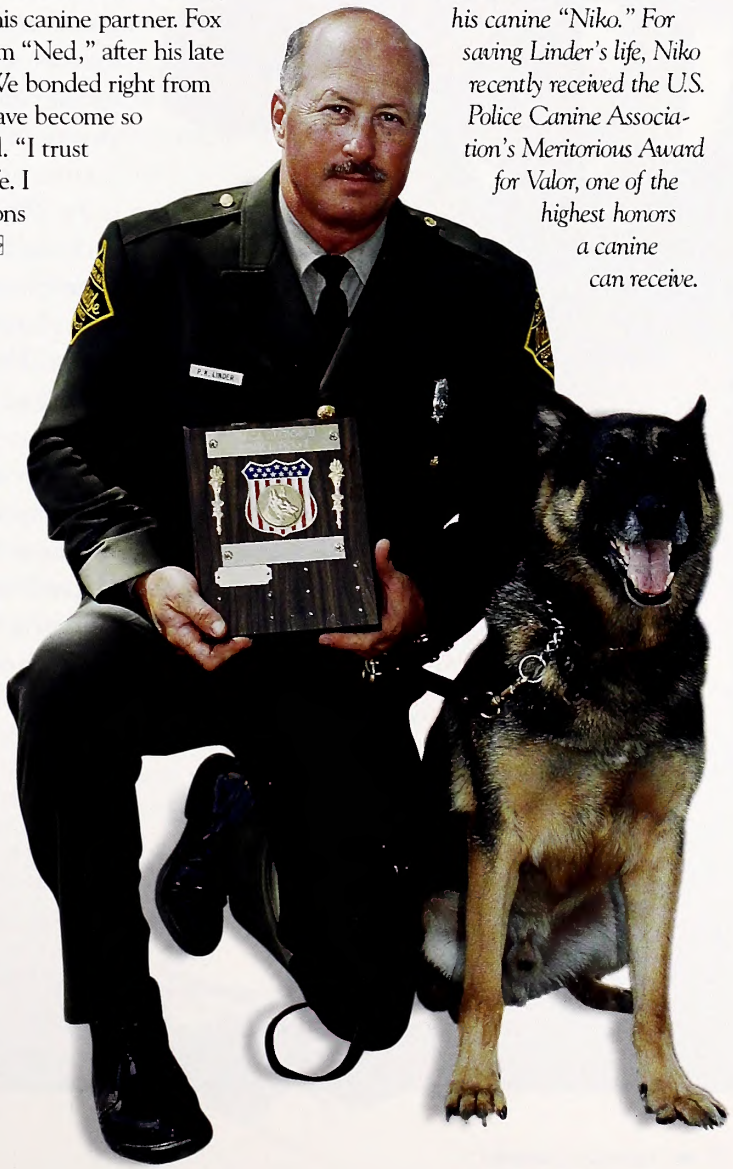
But with all the successes of being a canine handler also comes a 24-hour-a-day obligation. Their coats must be brushed, their cages cleaned and there's always another bath to be given. Officers describe being assigned a canine like a child coming into the family. Their wives, children and pets must be able to adjust to the new arrangement, and vacations or weekend getaways have to be scheduled around their furry co-worker. But to a man, the canine unit believes these are small prices to pay for having a partner always at their side. "I'm the only wildlife officer in Scotland County and 'Duke' gives me another set of eyes, ears and a nose," said Mike Inman, who recently joined the canine unit.

Being a canine handler means always being the go-to officer. They are the first to be sent in when a suspect flees into the woods, or hides in a house. They are usually the ones assigned to the chase vehicle during deer decoy stakeouts. And these teams are occasionally needed to track suspects for other law enforcement agencies, which can mean going after dangerous felons.

Situations like those are probably why such an extremely deep bond is formed between handler and canine. Officers say that they become so familiar with their canine that they are able to read their partner's body language as if they can hear what they're thinking. They also add that it's not unusual for a canine to intuit a command and execute it a split-second before one is actually given. This type of relationship leads to a lifelong friendship that typically continues after the canines are retired. Once a canine is declared inactive, handlers typically purchase their former partner from the Wildlife Commission to provide him with a pleasant retirement.

Officer Mark Fox said he immediately felt that strong connection when recently introduced to his canine partner. Fox even named him "Ned," after his late grandfather. "We bonded right from the start and have become so close," Fox said. "I trust him with my life. I have no questions about that." ⊠

"I would have drowned in that bog if 'Niko' had not been there."

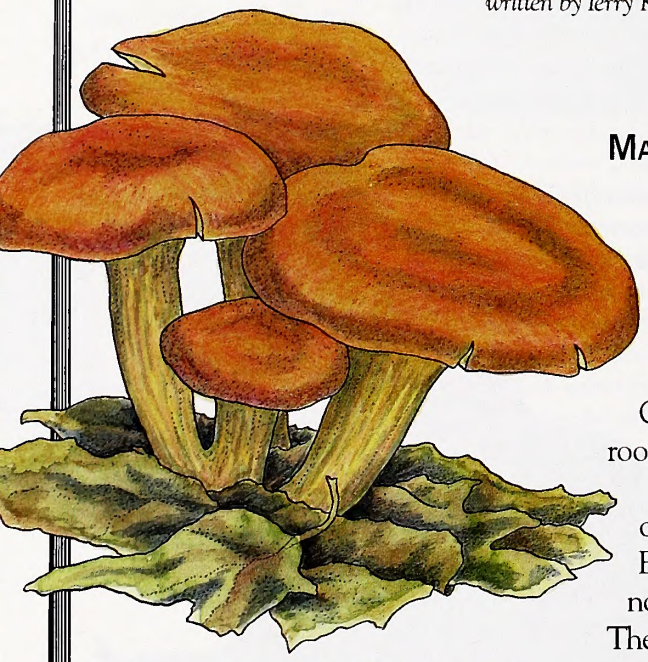


***Wildlife Enforcement** Officer Paul Linder kneels beside his canine "Niko." For saving Linder's life, Niko recently received the U.S. Police Canine Association's Meritorious Award for Valor, one of the highest honors a canine can receive.*

A soft, soaking rain falls steadily on a meadow. The next morning, mushrooms have popped up through the soil. Where did they come from? What are they doing?

The Fungus Among Us

written by Terry Krautwurst ©2000 / *illustrated by Consie Powell* ©2000



Jack-O'-Lantern (*Omphalotus illudens*)

Be careful! Studying mushrooms is fun, but remember, some mushrooms are poisonous. Don't eat or even taste an unknown mushroom. Only experts can tell the difference between a dangerous mushroom and one that's safe to eat.

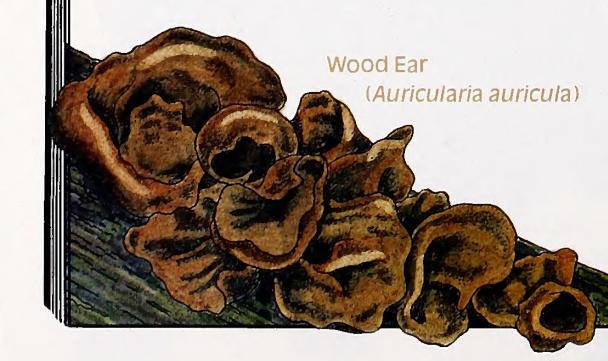
MAGNIFICENT MUSHROOMS

Picture an apple tree growing completely underground. The trunk and branches are buried. You can't see the tree at all. But every once in a while, apples come up through the ground one at a time or in little clusters.

Of course, apples don't grow that way. But mushrooms do. A mushroom is the "fruit," or **fruiting body**, of a fungus.

If you dig beneath a mushroom you'll find the fungus "tree," a tangle of white threads called a **mycelium**. The threads themselves are **hyphae**. Each hypha grows from the tip, like a plant root. But fungi are not plants. They don't reproduce from seeds, as plants do. They reproduce from **spores**, which are much smaller and simpler than seeds. Most are just a single cell.

One mushroom can produce thousands, or even millions, of spores. They are carried to different places by the wind, or by insects or animals that brush up against them. Only a few of a mushroom's spores **germinate** and produce new fungi.



Wood Ear
(*Auricularia auricula*)

Mushrooms can look like icicles, trumpets, turkey tails, coral, sponges or pig's ears. They can be purple, green, yellow, red or bright orange. Some bruise blue if you touch them. Others ooze a milky sap. A few, such as the jack-o'-lantern mushroom, glow in the dark!

Black Tulip
(*Urnula craterium*)

EATING HABITS

Fungi are unlike plants in another way. They lack chlorophyll, the green pigment that allows plants to make their own food by **photosynthesis**. Instead, fungi eat plants and animals, much as humans do. The difference is, we eat our food first and then digest it. Fungi do the opposite. Their hyphae release digestive **enzymes** that break down, or **decompose**, materials. Then they absorb the nutrients.

Many fungi grow and feed on nonliving organic matter such as fallen leaves, branches and limbs, old logs and tree stumps, manure, nuts or dead animals. These fungi are called **saprophytes**. Other fungi are **parasites**. They grow on, and steal nutrients from, living organisms. Parasitic fungi that eat too much or spread too rapidly can kill their **host**.

Shaggy Mane (*Coprinus comatus*)

Fly Agaric (*Amanita muscaria*)

HELPFUL HYPHAE

Some fungi attach to tree roots and help their hosts. Their spreading hyphae are like extra roots that draw in more water and soil nutrients for the tree. In exchange, the tree provides food the fungus needs. Many mushrooms feed only on or near a particular type of plant or material. Mushrooms and plants that have this give-and-take relationship are called **mycorrhizal**.

Rose Coral (*Ramaria subbotrytis*)

KINDS OF MUSHROOMS

There are thousands of kinds of mushrooms, in many shapes and colors. North Carolina has more species than any other state.

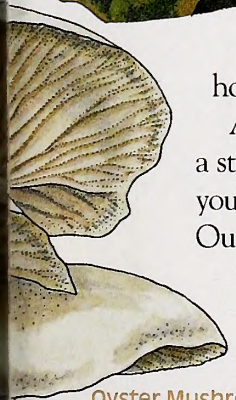
Most mushrooms have a stem and a cap. If you turn the cap over you'll find a circle of thin, fleshy **gills** or thousands of tiny holes. That's where the spores are.

All mushrooms make spores. But not all kinds have a cap, or even a stem. If you see a soft white or gray ball growing on the ground, you've probably found a puffball mushroom. Poke it gently. Poof! Out comes a cloud of spores, ready to be carried away by the wind. That's what happens when raindrops strike a puffball, too.

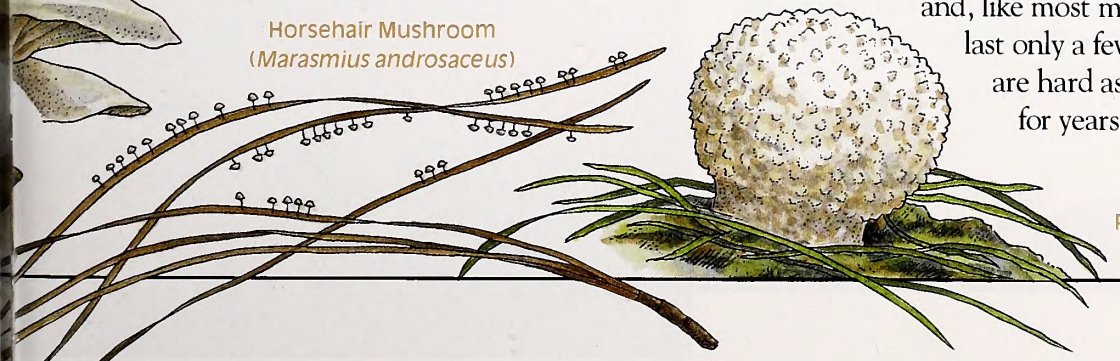
Gill-less fungi that stick out from trees or logs and look like little shelves or ruffled feathers are polypores. Their spores are stored in thousands of pores on their undersides.

Some polypores are soft and, like most mushrooms, last only a few days. Others are hard as wood and live for years.

Chicken of the Woods (*Laetiporus sulphureus*)



Oyster Mushroom (*Pleurotus ostreatus*)

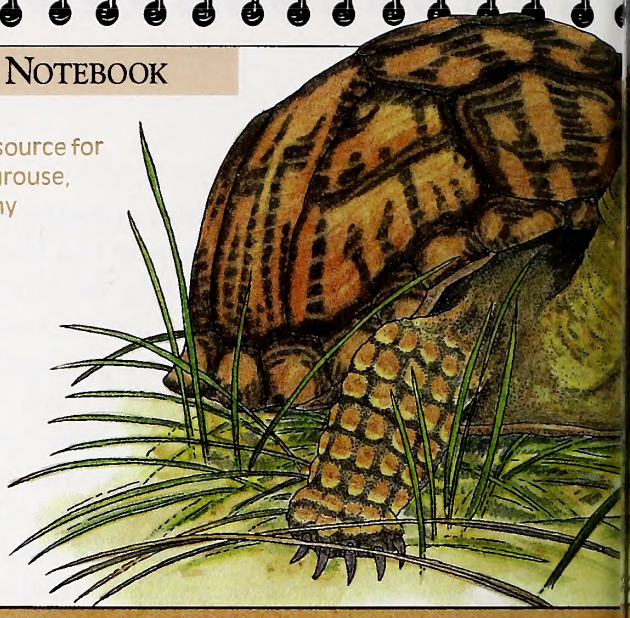


Horsehair Mushroom (*Marasmius androsaceus*)

Puffball (*Lycoperdon perlatum*)

Turkeytail Polypore
(*Trametes versicolor*)

Mushrooms are an important food source for wildlife. Deer, turkeys, quail, ruffed grouse, squirrels, chipmunks, turtles and many invertebrates eat mushrooms.



What Does It Mean?

decompose: to cause to rot
enzymes: chemicals, produced by living organisms, that cause a change in another material or substance
fruiting body: the part of a fungus that makes spores
germinate: to start to grow
gills: thin, fleshy blades on the underside of the cap of many mushrooms, where spores are produced
host: the plant or animal from which a parasite takes nutrients
hyphae: (singular: hypha) the individual threads that together make up the mycelium
mycelium: the body of a fungus, made of rootlike threads
mycorrhizal: a fungus and a plant living in a partnership in which both benefit
parasite: an organism that feeds by stealing nutrients from a living plant or animal
photosynthesis: the process by which chlorophyll in a green plant uses solar energy to convert carbon dioxide and water into sugars and other foods needed by the plant
saprophyte: an organism that feeds on the remains of dead plants or animals
spore: single-celled reproductive unit of a fungus

Read and Find Out

- *Katya's Book of Mushrooms* by Katya Arnold and Sam Swope, Henry Holt & Co., 1997.
- *Fungi* by Jenny Tesar, Blackbirch Press, Inc., 1994.
- *A Field Guide to Southern Mushrooms* by Nancy Smith Weber and Alexander H. Smith, University of Michigan Press, 1985.
- *The Audubon Society Field Guide to North American Mushrooms* by Gary H. Lincoff, Alfred A. Knopf, 1984.

In *Wildlife in North Carolina*

- "Mecca for Mushrooms" by Lucy Coulborne, August 1981.
- "The Soil Makers" by Lawrence S. Earley, October 1984.
- "Valley of Mushrooms" by Harry Ellis, March 1985.
- "After The Storm: Wood Decay" by Lawrence S. Earley, July 1997.

Black Morel
(*Morchella elata*)

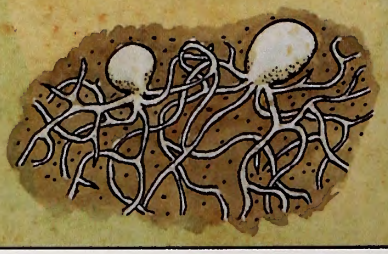
Editing and design by Consie Powell.
Art puzzle by Anne Marshall Runyon.

Birth of a Mushroom

1) A fungus spore, one of thousands released from a mushroom, lands on a place where there is enough moisture and the right kind of food for that species.

2) The spore germinates and sprouts hyphae. The hyphae form a tangled mass, the mycelium.

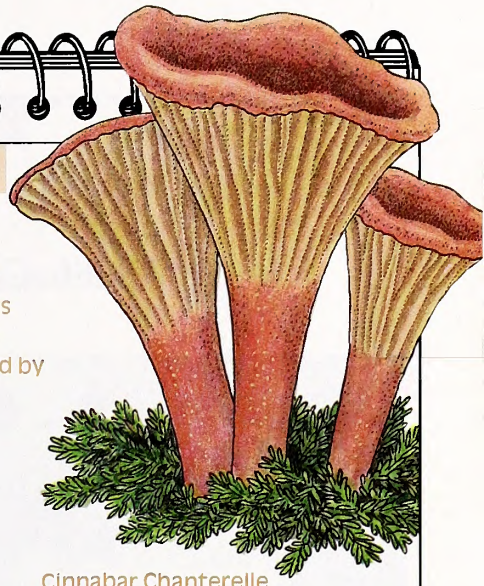
3) As the mycelium grows, some of its hyphae develop rounded swellings.



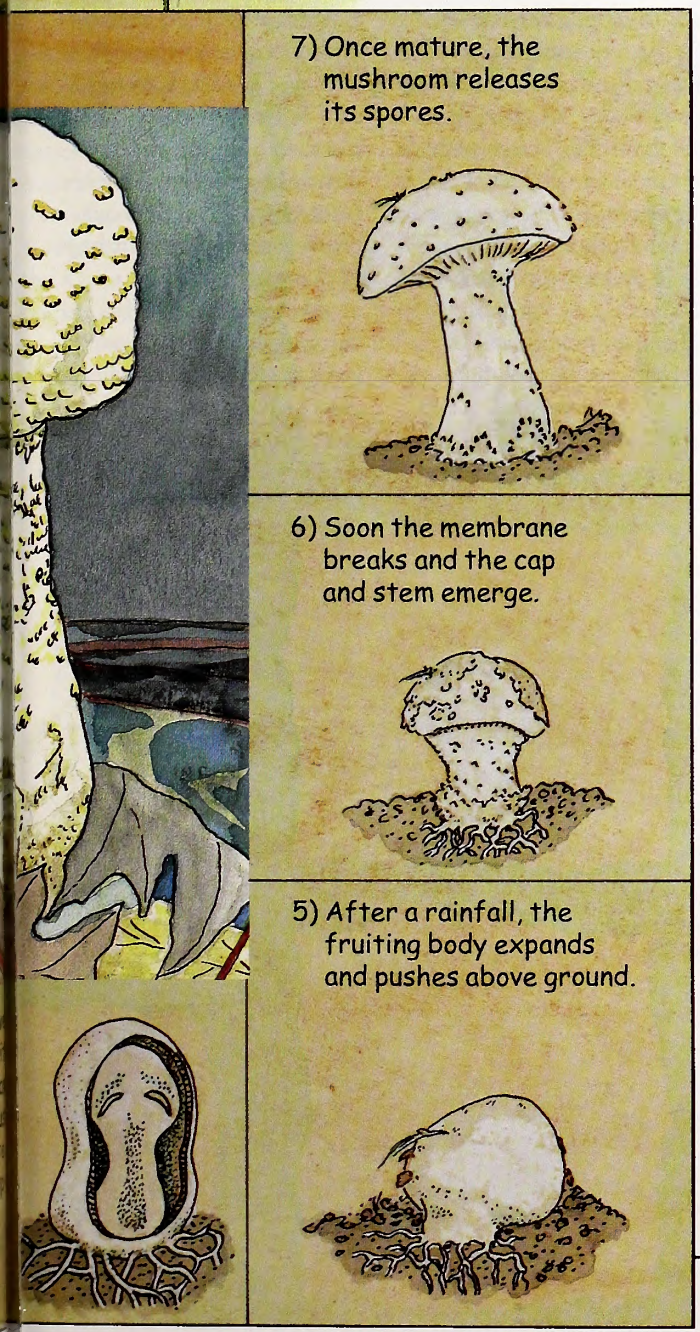
4) Inside each swe ing, enclosed with a thin membran is a future mush room complete with stem, cap and gills.

There are more than 100,000 kinds of fungi. Not all produce mushrooms. Other fungi include molds, such as those that grow on food, and yeasts like the ones used to make bread. Fungi live almost everywhere. The rash called athlete's foot is caused by a fungus. The mildew on a basement wall is a fungus, too. The soil in an average garden contains more tiny fungi than there are people on Earth!

Slippery Jack
(*Suillus luteus*)



Cinnabar Chanterelle
(*Cantharellus cinnabarinus*)



It's WILD!

Project WILD activities for teachers and students that correlate to this topic include:

Wild Edible Plants: teaches students to identify a native edible plant and understand the relationship between cultivated and wild edible plants.

Good Buddies: teaches students to understand interdependence between species of living organisms.

Get Outside

Go mushroom hunting in a park, field, forest or your own backyard—mushrooms grow almost everywhere. Some are big and easy to spot. Others are tiny or hide beneath leaves or inside tree cavities. How many kinds can you find?

Learn to identify mushrooms. There are thousands of different mushrooms. You have to look carefully and ask questions—like a detective—to figure out what kind you're looking at. What shape and color are the cap and stem? How are the gills arranged? Where is the mushroom growing? Use your answers and a field guide to help you find the mushroom's common and scientific names.

Make spore prints. Spore color is another clue to a mushroom's identity. To make a spore print, cut off a mushroom's stem. Then put the cap, gill- or pore-side down, on a piece of paper. (If the gills are white, use dark-colored paper; if not, use white paper.) Cover the cap with a bowl or jar. The next day, lift the cap to reveal an interesting print.

Many mushrooms have descriptive names: yellow foot, black jellydrops, witch's hat, chicken of the woods, dead man's fingers, bear's head and stinkhorn. Poisonous mushrooms often have dangerous-sounding names, like destroying angel and poison pie.

Lemon Cup
(*Bisporella citrina*)

Wildlife Commission to Promote Small Game Management

CAROLINA BIOLOGICAL SUPPLY CO.

***Small game like this** quail chick are what the Wildlife Commission hopes to see more of, as a result of a recent shift in wildlife management emphasis.*

With big game animal populations at record highs, the N.C. Wildlife Resources Commission recently approved a major initiative to put emphasis on small game management.

The plan calls for the implementation of a wide array of management strategies, some restructuring of the Division of Wildlife Management and the addition of eight new positions.

Due to North Carolina's changing landscape and the trend toward intensive farming, quail populations have declined 60 percent since the 1960s. David Cobb, chief of the Division of Wildlife Management, said statewide restoration of quail populations is not feasible; however, intensive management in key locations may produce results.

"There are too many factors outside of the Commission's control that negatively impact small-game habitats," Cobb said. "We do believe, however, that there are geographical areas where current quail populations, land-use patterns and landowner interest are sufficient for Wildlife Commission efforts to boost quail numbers. These efforts will also improve habitat for other wildlife dependent on early successional habitats."

The main strategy will be to identify specific geographical areas where the potential to improve quail habitats and populations on private lands is the greatest. By developing an outreach program and a system of small-game cooperatives, participating landowners with at least 5,000 acres will be offered technical guidance and assistance to promote habitat for small game and other species associated with early successional habitats. These enrolled properties will also be eligible for economic incentives funded by the Wildlife Commission. Wildlife Commission staff will work to enroll these private properties in a number of state agriculture and forestry programs designed to promote habitat conservation.

In an attempt to develop further economic incentives, a team of Wildlife Commission staff will evaluate the North Carolina tax codes to recommend revisions that, if implemented, would establish tax breaks for landowners managing for wildlife habitat.

Also, wildlife biologists are currently inventorying game lands to identify tracts where quail management can be implemented or expanded. Once determined, resources will be concentrated on those properties.

To continue quail research, the Division of Wildlife Management will implement early successional habitat on one or more large farms.

—Chris Powell

Edited by Chris Powell

Hunting License Sales Post Major Increase

Hunting license sales nationwide rebounded significantly in 1999, pushing past the 15 million mark for the first time since 1996, according to a National Shooting Sports Foundation analysis.

Reflecting those statistics, hunting license sales in North Carolina have also continued to increase, rising from 329,000 in 1986 to just under 400,000 in 1999.

"This is obviously excellent news but not a total surprise," said Bob Delfay, president of NSSF. "This suggests to us that the outreach efforts by many state wildlife agencies has begun to pay off, making this significant increase possible in 1999. We think there is no reason not to expect another increase next year."

—Courtesy of the National Shooting Sports Foundation

North Carolina Outdoor Calendar of Events

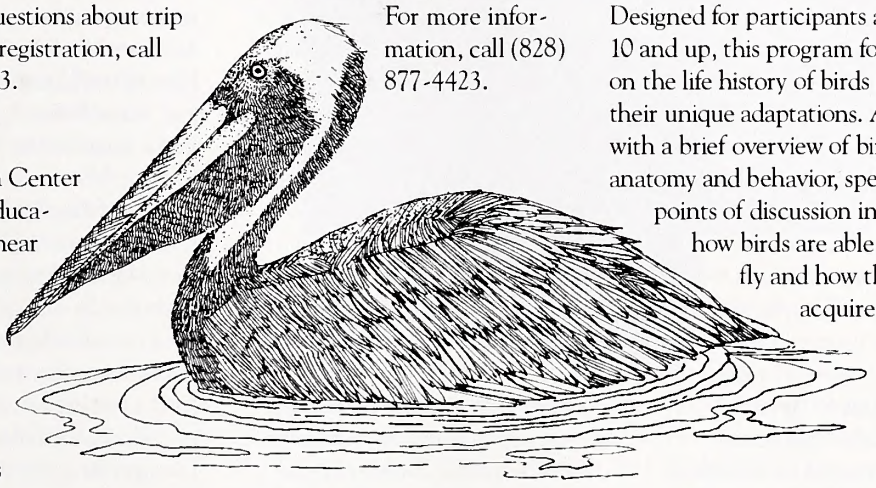
On several occasions, events in this calendar have been changed without notice. Readers should check with the contact listed before traveling to an event. Items for listing should be conservation oriented and should be sent at least four months in advance.

Nov. 3-5

The 4th annual Wings Over Water Festival will be held on the Outer Banks to celebrate the wildlife and wild lands of eastern North Carolina. The event, which is sponsored by several groups including the U.S. Fish and Wildlife Service and the Coastal Wildlife Refuge Society, will feature workshops, lectures and field trips with a focus on birdwatching. Nearly 100 field trips and workshops are scheduled on the Outer Banks and the mainland. For more information, call (252) 441-8144. For specific questions about trip availability or registration, call (252) 473-1333.

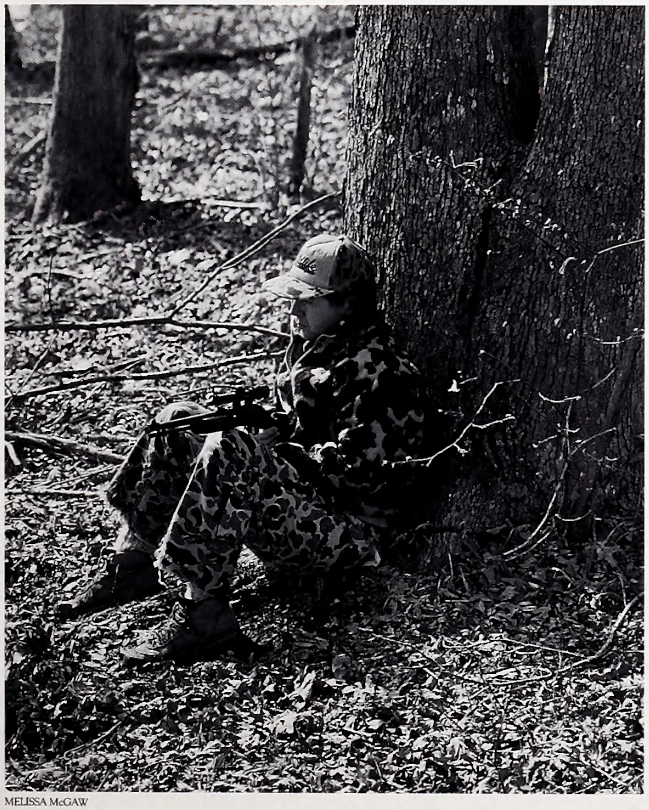
Nov. 10, 11

The Pisgah Center for Wildlife Education, located near Brevard, will conduct the Wild Geology program from 9 a.m. to 3 p.m. This educator workshop focuses on the geology of Southern Appalachia and the unique flora and fauna it supports. Participants will also learn the basics of GPS (Global Positioning System) use. For more information, call (828) 877-4423.



Nov. 14

The Pisgah Center for Wildlife Education, located near Brevard, will conduct the Beaks, Feathers & Flight program from 4 p.m. to 5 p.m. Designed for participants ages 10 and up, this program focuses on the life history of birds and their unique adaptations. Along with a brief overview of bird anatomy and behavior, specific points of discussion include how birds are able to fly and how they acquire food.



MELISSA McGAW

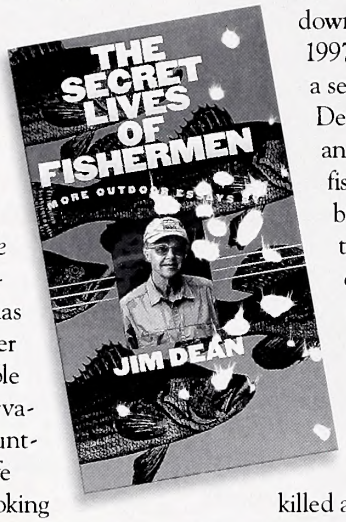
Field Notes

Eastern Gun Deer	Through Jan. 1
Central Bow and Arrow Deer	Through Nov. 4
Northwestern Bow and Arrow Deer	Through Nov. 11
Western Bow and Arrow Deer	Through Nov. 18
Central Muzzleloading Deer	Nov. 6-Nov. 11
Black Bear	See *Regulations Digest*
Red & Gray Squirrel	Through Jan. 31
Fox Squirrel	Through Dec. 30
Fox	See *Regulations Digest*
Raccoon and Opossum	Through Feb. 28
Ruffed Grouse	Through Feb. 28
Rails, Gallinules and Moorhens	Through Nov. 11
Crow	June 1 to Feb. 24 plus Labor Day
Bobcat	Through Feb. 28

Information on bag limits, either-sex deer season and other regulations may be found in the *2000-2001 North Carolina Inland Fishing, Hunting & Trapping Regulations Digest*. For a copy, check with license agents or contact the N.C. Wildlife Resources Commission at (919) 662-4370.

Book Review: *The Secret Lives of Fishermen: More Outdoor Essays*

The Secret Lives of Fishermen: More Outdoor Essays *by Jim Dean. Published by the University of North Carolina Press. $24.95, hardback.*



In his second book of essays, *The Secret Lives of Fishermen*, Jim Dean has rounded up another varied and enjoyable collection of observations on fishing, hunting, the country life and days spent "poking around on freshwater rivers, lakes and ponds."

For readers of *Wildlife in North Carolina*, many of these short essays will be familiar since they first appeared as "Natural Heritage" columns in the years after Dean stepped down as editor in 1997. They are worth a second savoring.

Dean loves to fish, and he takes his fishing seriously, but he still is able to offer a bemused eye on a fisherman's complicated life—whether it's his need for a fishing car, for collecting road killed animals for fly-tying purposes, or for using a very special jargon. And is it "fisherman," "fisherperson" or "fisher" anyway? The author negotiates a careful passage through these political waters.

The reader will enjoy several classic essays that have appeared here and elsewhere. Among reader favorites is the "Pointer of No Return," a hilarious story that any long-suffering, canine-chasing bird hunter will relish. "We knew [Buck] could find birds; we just wanted him to find some in the same county we planned to hunt," Dean comments.

And if there's a subject other than fishing or hunting that summons Dean's best writing, it's undoubtedly eating. He can make your mouth water just describing a country breakfast. "...you'd stuff a clabber biscuit with a slab of country ham, fried fatback, sausage, scrapple, bacon, or country-fried steak."

"Country Store Gourmet" is a tongue-in-cheek account of the culinary pleasures to be found in the modest country stores that once played a more prominent role in the state than they do today. "Avoid reading the label on the potted meat," he advises the country store neophyte, "unless you are uncommonly interested in the final disposition of pork snouts, beef hearts, stomachs, lips, ears, and a variety of less distinguished cuts."

Whatever he is writing about, Dean is sure to treat it with a wry and gentle eye. Though change is sweeping through the state with the force of a runaway freight train, Jim Dean's warm eye is still stopped by the lightning bugs playing across the twilit fields, an oil lamp burning in the window and a crisp fall day spent afield with a good dog.

—*Lawrence S. Earley*

2000-2001 Bag Limits, Shooting Hours and Season Dates for Waterfowl

BAG LIMITS

Conventional bag: Six ducks with no more than one black duck (black duck season is closed until Dec. 1), four mallards with no more than two hen mallards, two wood ducks, two redheads, three scaup, four scoters, one fulvous tree duck, one mottled duck, one canvasback or one pintail. The season on harlequin ducks is closed. (Possession limits are twice the daily bag unless otherwise noted.)

Other Limits: a) 15 snow & blue geese, no possession limit
b) two brant
c) five mergansers (one hooded merganser)
d) seven sea ducks (four scoters) in special sea duck areas only
e) 15 coots
f) two Canada geese

SHOOTING HOURS: One-half hour before sunrise to sunset.

SEASONS

Ducks, Mergansers & Coots: Oct. 4-7, Nov. 6-25 and Dec. 8-Jan. 20

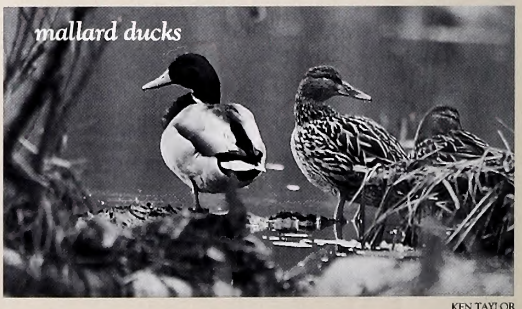
Sea Ducks: Oct. 2-Jan.20

Canada Geese: Oct. 2-Nov. 15 except for Northeast hunt unit and Northampton County 1. (See previous announcement for September seasons.)

Snow & Blue Geese: Oct. 23-Oct.31; Nov. 16-March 10

Brant: Nov. 13-25; Dec. 8-Jan. 20

Swan: Oct. 19-Jan. 31 (By permit only; 5,000 will be issued)



KEN TAYLOR

Youth Waterfowl Day: Jan. 27, 2001. Youths must be 15 years of age or younger and accompanied by an adult at least 21 years of age. Species include ducks, mergansers and coots. The adult may not hunt these species.

You may also call 1-800-675-0263 for this information. Report all bands by calling 1-800-327-BAND.

On Patrol

Editor's note: *Listed below is a report of a situation that exemplifies the always unpredictable nature of a N.C. Wildlife Resources Commission enforcement officer's duty.*

While patrolling an area near the Pocosin Lakes National Wildlife Refuge in Hyde County for closed-season bear hunting, Wildlife Enforcement Officer Robert Wayne and a federal officer observed a man release a pack of bear dogs. As the man and dogs chased a bear into a block of woods, Officer Wayne slipped in on foot. Wayne heard the dogs bay and was able to get close enough to see the bushes and small trees shaking as the bear fended off the dogs. Then Wayne saw the hunter tear through the brush toward the bear. The wildlife officer couldn't believe that he was about to witness a closed-season bear violation, and took cover behind a large gum tree in case the man fired a weapon.

But instead of shooting, the hunter let out a loud yell. Wayne stepped out from behind the tree in time to see the woods part before him. The black bear emerged at a full run heading straight for the wildlife officer. The huge beast with 10 Walker hounds on its heels passed within inches of the officer, as he sidestepped behind the tree like a bullfighting matador. *Ole'!* The officer then stepped back from behind the tree coming face-to-face with the man, startling both of them. As the officer checked his license and searched for a weapon, the man said that he needed to sit down for a few minutes to compose himself, because the stealthful officer had scared him to death. Officer Wayne then admitted that he could use a breather as well, because a 600-pound bear, 10 Walker hounds and a bear hunter from Maine had just about run him over.

Turtle Poachers Beware

The Wildlife Commission's Division of Wildlife Management recently began working with the U.S. Fish and Wildlife Service to implant Passive Integrated Transponder (PIT) tags in bog turtles.

The project is an effort to permanently mark turtles with uniquely numbered tags to deter poaching of the various turtle species in the Southeast. To test the PIT tagging procedures, 38 turtles of various species, sexes and age classes were tagged at the North Carolina State Museum of Natural Sciences. Also, two wild bog turtles from a site in Wilkes County were tagged and fitted with radio transmitters. All of these turtles will be monitored to ensure the tagging has no physical effect.

Following monitoring, a number of wild turtles will be tagged and released. Turtles that are captured can be scanned, indicating whether they have been implanted and from which sites.

—Courtesy of the Division of Wildlife Management

The 2001 North Carolina Wildlife Calendar Is Here!

"Running the Wave" by Robert B. Dance is one of 12 fine paintings featured in the 2001 North Carolina Wildlife Calendar. *Order now before it's sold out.*

The works of Robert B. Dance, Robert C. Flowers Jr., Duane Raver, Dempsey Essick, Tim Larson, Cotton Ketchie, Keith Hendrickson, Curwood Harrison, James A. Brooks, Mel Steele, Robert Herr and Amy Gardner Dean are featured in the *2001 North Carolina Wildlife Calendar*.

Order yours today! Payment must accompany your order. Calendar orders may be charged to VISA or MasterCard, or enclose your check or money order (payable to NCWRC). Complete the form below and mail with payment to:

2001 Calendar, N.C. Wildlife Resources Commission
1710 Mail Service Center, Raleigh, N.C. 27699-1710
(Office is located at 322 Chapanoke Road in Raleigh.)

A GREAT GIFT!

Please send me _____ calendars at $6.00 each .....$_____

All N.C. residents add $.36 sales tax per calendar ..... _____

☐ Enclosed is my check for **total** payment of .....$_____

☐ Charge to MasterCard or VISA for the calendar(s) ordered above. My card number is _____ and the expiration date is _____/_____.

_____ (_____)_____
Card holder signature | Day Time Phone No.

If ordering 10 or more calendars, please provide your UPS deliverable address.

Name _____

Address _____

City/State/Zip_____

Phone (_____) _____

All orders must be prepaid. A $20 charge will be made on returned checks (N.C.G.S. 25-3-512). **For fund raising and bulk rate information (10 calendars or more), call 919-662-4377. Please allow 4 weeks for delivery.**

Catch Us at These Numbers

- **1-800-662-7137** to report violations of hunting and fishing laws.
- **1-800-628-3773** (NC VESSEL) for boat registration and titling.
- **1-800-675-0263** for hunting dates and shooting hours for migratory game birds.
- **1-888-248-6834** (2HUNTFISH) to purchase most licenses with VISA or MasterCard using a touch-tone telephone.
- **1-800-446-8663** (I GOT ONE) to report big game harvests.
- Connect to the Commission's online web site at **http://www.ncwildlife.org**

The N.C. Wildlife Resources Commission maintains five toll-free telephone numbers to provide better services and convenient access to information for North Carolina citizens. Calls are answered in order, but some numbers may require a wait during busy seasons.

VISA MasterCard

Wildlife Endowment Fund Report

Totals Through August 2000

Principal Balance
$30,537,761.93

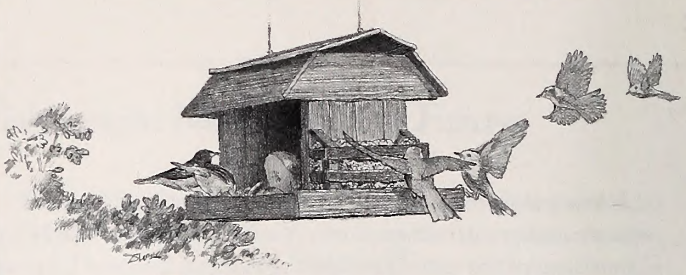
Interest Earned
$31,514,352.78

Total Receipts
$62,052,114.71

Interest Used
$20,436,178.04

Fund Balance
$41,615,936.67

Established on May 29, 1981, this fund is derived from the sale of lifetime hunting and fishing licenses and lifetime subscriptions to *Wildlife in North Carolina* magazine as well as from tax deductible contributions. While the interest may be used to supplement N.C. Wildlife Resources Commission programs, the principal remains invested to generate additional interest for the future.



Fall Housekeeping

by Rodney Foushee

With fall in full swing, here are some tips to improve your backyard birding success.

Migrant Invasion: With the return of most migratory songbirds and plenty of resident birds around, now is an excellent time to have your bird feeders stocked with food. In addition to high-quality seed mixtures, here are some foods that are bound to please hungry feathered visitors.

Dried fruit including raisins and currants make excellent food for robins, thrushes, cedar waxwings and bluebirds. Meanwhile, mockingbirds, catbirds, tanagers and orioles enjoy fresh fruit including sliced apples and oranges. Dried fruit can be mixed in directly with a seed mix or served separately, while fresh fruit should be placed on a feeding platform out of the reach of cats.

Suet, either store-bought or homemade, makes excellent high-energy food for wintering birds including woodpeckers, titmice, chickadees and nuthatches. You can make your own by mixing beef fat or peanut butter with cornmeal or oatmeal. You can also add seeds or dried fruit for variety.

Martin Houses: Now that the purple martins have headed south for the winter, this is a good time to take down your martin houses or close their entrances off to prevent house sparrows and starlings from taking up residence over the winter.

Attracting Western Hummers: Think twice before taking down your hummingbird feeder this fall. Just because the ruby-throated hummers you've been seeing this summer are heading south for the winter doesn't mean other species won't enjoy your sugary offering.

Several western hummingbird species stray from their normal migration routes and stop off in North Carolina during the fall and winter. The rufous hummer is the most often reported of these western wanderers. The male rufous can be identified by its reddish-brown color. Other western species spotted in North Carolina in recent years include the black-chinned, Anna's and calliope hummingbirds.

Partners in Flight: Interested in learning more about migratory birds and what you can do to help them. Check out the N.C. Partners in Flight website at http://www.faculty.ncwc.edu/mbrooks/pif/. The site is loaded with information on migratory birds in North Carolina and conservation efforts to help these birds, including fact sheets covering many common backyard species.

N.C. WILD STORE

Dazzling Butterflies

We've chosen a brilliant selection of rare and common butterfly species for our newest posters. Seventeen common butterflies and 19 rare species, in all their radiant color, adorn the posters. Range maps depict where each butterfly is found, and informational text highlights the connections between the butterflies and their habitats.

Common North Carolina Butterflies

What's the wing span of a Question Mark butterfly? Learn this and much more from this educational poster. 22" x 34". **$8.**
ITEM CODE **P15**

Rare North Carolina Butterflies

Learn why these species are considered rare or endangered. 22" x 34". **$8.** ITEM CODE **P16**

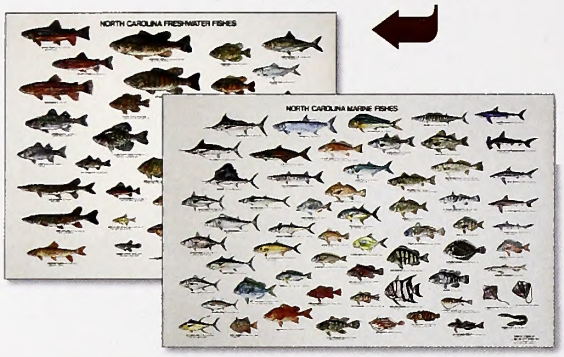
Butterfly Posters Set

Buy both posters and save! **$14.** ITEM CODE **P17**

All proceeds from the sale of these products support the development and production of conservation education projects and programs.

N.C. WILD STORE

North Carolina's freshwater fish and marine fish are colorfully displayed on individual posters, and feature the art of Duane Raver. Reel yours in today!



Fishes of North Carolina

Set of 2. Freshwater fish poster shows 36 state species (size 28" x 22 1/2"). Marine fish poster shows 60 species (size 35" x 22 1/2") $10.

ITEM CODE **P9**

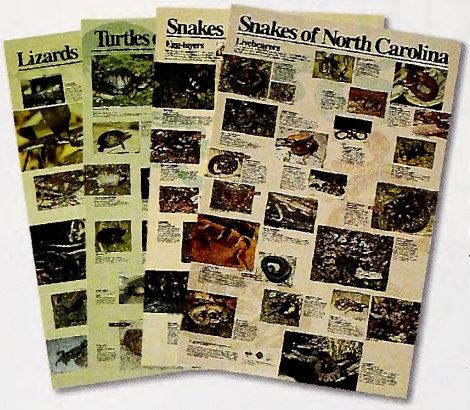
Nature's Ways Collection

Explore the wonders of the natural world, wildlife species and ecosystems through "Nature's Ways." More than 200 essays from *Wildlife in North Carolina* have been compiled in a beautiful 6-volume paperback set. $27.50.

ITEM CODE **M9**

Also available as a boxed set. $30.

ITEM CODE **M10**



Before going on your next outdoor hike or camping trip, be sure you know North Carolina's reptiles.

Reptiles of North Carolina

Set of 4 posters in full color. Each poster decribes the species and denotes which reptiles are on the endangered, protected or special concern list. A set includes: lizards, turtles, and both live-bearing snakes and egg-laying snakes. Posters are sized 22" x 34". $18. ITEM CODE **P10**

Amphibians of North Carolina

The Hylid Frogs. North Carolina's tree frogs, cricket frogs and chorus frogs, belonging to the large family *Hylidae*, are presented in this colorful poster, one of two frog posters in the Amphibians series. 22" x 34". $6.

ITEM CODE **P11**

Amphibians of North Carolina

True Frogs and Toads. The second poster in the Amphibians series showcases true frogs and toads. Vibrant photos combine with informative text to make it a standout in the classroom or at home. 22" x 34". $6.

ITEM CODE **P14**

Waterfowl Decoys of N.C.

Nineteen classic waterfowl decoys from North Carolina's legendary days of waterfowl hunting have been collected for the first time on this framable, high-quality poster. This is the first in a series of "Sporting Heritage" posters. 22" x 34". $10.

ITEM CODE **P12**

Traditional Trout Flies of the Southern Appalachians

Sixteen traditional trout flies are presented in stunning color detail. Each fly is accompanied by a brief history of its development and use in Appalachian waters as well as the components that make up each hand-tied creation. Second in a series of "Sporting Heritage" posters. 22" x 34". $10. ITEM CODE **P13**

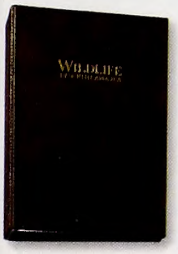
Bird Houses & Feeders: How to Build and Enjoy Them

An eight-page illustrated guide to building bird houses and feeders. $2.

ITEM CODE **M6**

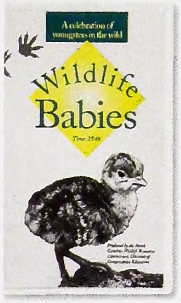
Dogs that Point, Fish that Bite

Here are 50 of the best "Our Natural Heritage" columns written by Jim Dean for *Wildlife in North Carolina* over the past 17 years. Published by the University of North Carolina Press and the N.C. Wildlife Resources Commission. 220 pages. Hardbound $19.95. ITEM CODE **M8**
Paperback $10.95. ITEM CODE **M12**



Magazine Binder

Store 12 issues of *Wildlife in North Carolina* in a sturdy binder. $10.
ITEM CODE **M2**



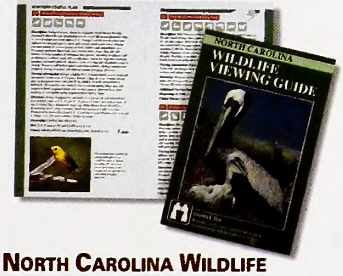
Wildlife Babies Video

Entertaining 25-minute video version of the classic 1965 Jack Dermid film reveals springtime antics of young wood ducks, black bear, possums, cottontails and others . $20.
ITEM CODE **N9**

Based on Chief Seattle's 1855 speech, the film's focus is on environmental ethics. Accompanied by This Land Is Sacred, this film is a must-see for everyone. It is destined to become a classic.

All Things Are Connected

Video and Activity Guide. $22.
ITEM CODE **W3**



North Carolina Wildlife Viewing Guide

From Cape Hatteras to the Great Smokies, *North Carolina Wildlife Viewing Guide* will lead you to 90 of the state's premier wildlife viewing locations—and better your chances of seeing wildlife once you get there. $5.95. ITEM CODE **N6**

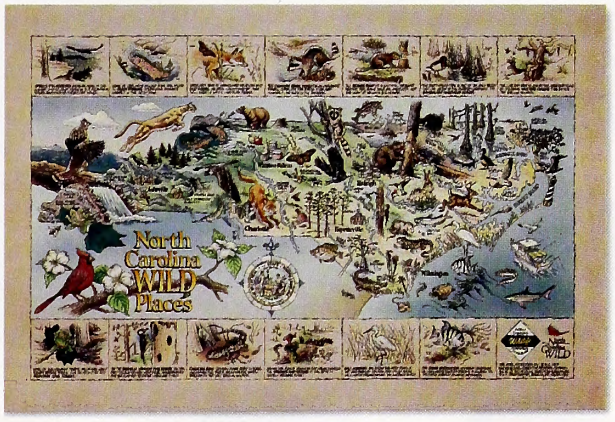
Gardens for Butterflies

Article reprint from *Wildlife in North Carolina* magazine for the gardener who wants to attract some of nature's most colorful creatures. $2. ITEM CODE **M5**

Scouting Correlations

Cub, Boy and Girl Scout requirements are correlated to Project WILD and Aquatic WILD activities. Supplements Scout leaders' planning materials and events. Each $3.
Cub & Boy Scout Correlation. ITEM CODE **E9**
Girl Scout Correlation. ITEM CODE **E10**

North Carolina's wildlife habitats come alive in this 82-page, easy-to-read, soft cover book. With delightful illustrations by Anne Marshall Runyon, N.C. WILD Places covers 13 habitats across the state.



North Carolina WILD Places: A Closer Look

Book and Posters Set. With each book you'll receive two habitat posters (also by Runyon) and a N.C. WILD Places Map poster, featuring the art of Jackie Pittman. $16. ITEM CODE **E6**

North Carolina WILD Places Teacher's Guide

For teachers using *North Carolina WILD Places* in the classroom, these activities and games will heighten student awareness of wildlife habitats. $6.
ITEM CODE **E7**

More terrific items

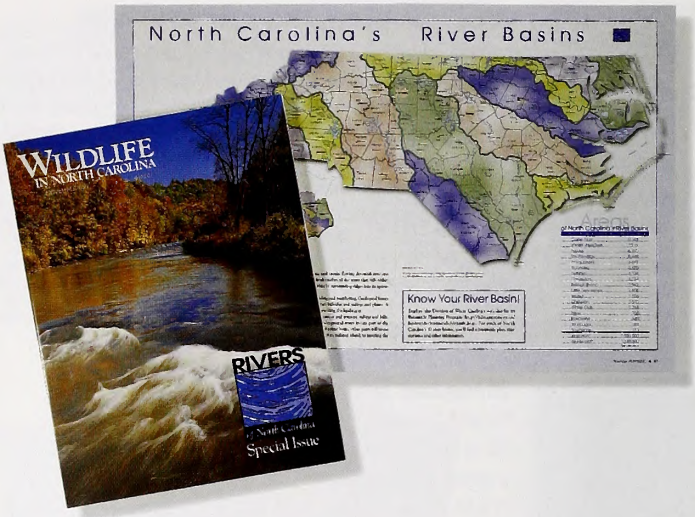
N.C. WILD STORE

N.C. WILDLIFE PROFILES BINDER & N.C. WILDLIFE PROFILES SETS 1-12

This top-quality 3-ring binder includes:

- 120 illustrated fact sheets, each profiling an animal's history, status, habitat and behavior, and also containing a range map.
- Tab dividers that organize 12 sets of wildlife fact sheets by class.
- A table of contents, index and instruction sheet.

$30. ITEM CODE **W17**



RIVERS OF NORTH CAROLINA

This 128-page special issue of *Wildlife in North Carolina* examines issues relating to North Carolina's rivers, from canoe trips to water-quality to the real-life stories of people working to save our rivers.

For timely coverage of all of North Carolina's river basins, as well as eye-catching photos and educational maps and graphics, there's nothing else like it on bookshelves anywhere. Order "Rivers of North Carolina" for your own bookshelf, or give it to friends and family members to enjoy. For $10, plus shipping and postage, you'll have a coffee-table edition that's already being hailed as a classic. $10. ITEM CODE **M11**

EMBROIDERED CAPS

A1

A10

A11

A3

A7

A6

N.C. WILD Caps. N.C. WILD cardinal on two-tone, brushed-cotton twill cap with a Velcro® closure. **$16.50 each.**

- Tan cap with forest green bill. ITEM CODE **A1**
- Tan cap with burgundy bill. ITEM CODE **A10**

Wildlife in North Carolina Caps. Exclusive designs and magazine logo are featured on four different cap styles. **$16.50 each.**

- Deer silhouette on 6-panel, solid back cap. Advantage® Camouflage on cap and bill with plastic snap. ITEM CODE **A11**
- Brook trout on sage-colored, brushed cotton cap with an unstructured front, extended bill, and nubuck suede closure. ITEM CODE **A3**
- Deer silhouette on blaze orange cap with brown waxcloth bill. ITEM CODE **A7**
- Deer silhouette on Advantage® Camouflage cotton cap with tan suede bill. ITEM CODE **A6**

PISGAH CENTER FOR WILDLIFE EDUCATION T-SHIRT

100% cotton natural color tee with design on back and Pisgah logo on front. $14.50.
ITEM CODES:
A8MED (medium)
A8LRG (large)
A8XLG (extra large)
A8XXL (extra extra large)

WEE TEES

Just like the adult shirt with Pisgah design, only smaller.
ITEM CODES:
A9XS (extra small; size 2-4) $10.
A9SM (small; size 6-8) $12.50.
A9MD (medium; size 10-12) $12.50.
A9LG (large; size 14-16) $12.50.

WILDLIFE IN N.C. T-SHIRT

WINC magazine logo on front pocket. Tundra swan art on back. White. $14.50. ITEM CODES:
A5MED (medium)
A5LRG (large)
A5XLG (extra large)
A5XXL (extra extra large)

N.C. WILD T-SHIRT

N.C. WILD logo printed on front and colorful art on back. White. $14.50. ITEM CODES:
A4MED (medium)
A4LRG (large) ☛ SOLD OUT
A4XLG (extra large)
A4XXL (extra extra large)

MELISSA McGAW

DON'T WAIT FOR SANTA

You can give your special someone a gift subscription to *Wildlife in North Carolina* anytime of the year.

But to make sure your gift card arrives before St. Nick, order now. For details and order forms, see our holiday cover wrap.

Clash of Titans

During the rut, rival bucks often fight for the right to breed. For more action, see photo story on page 22.

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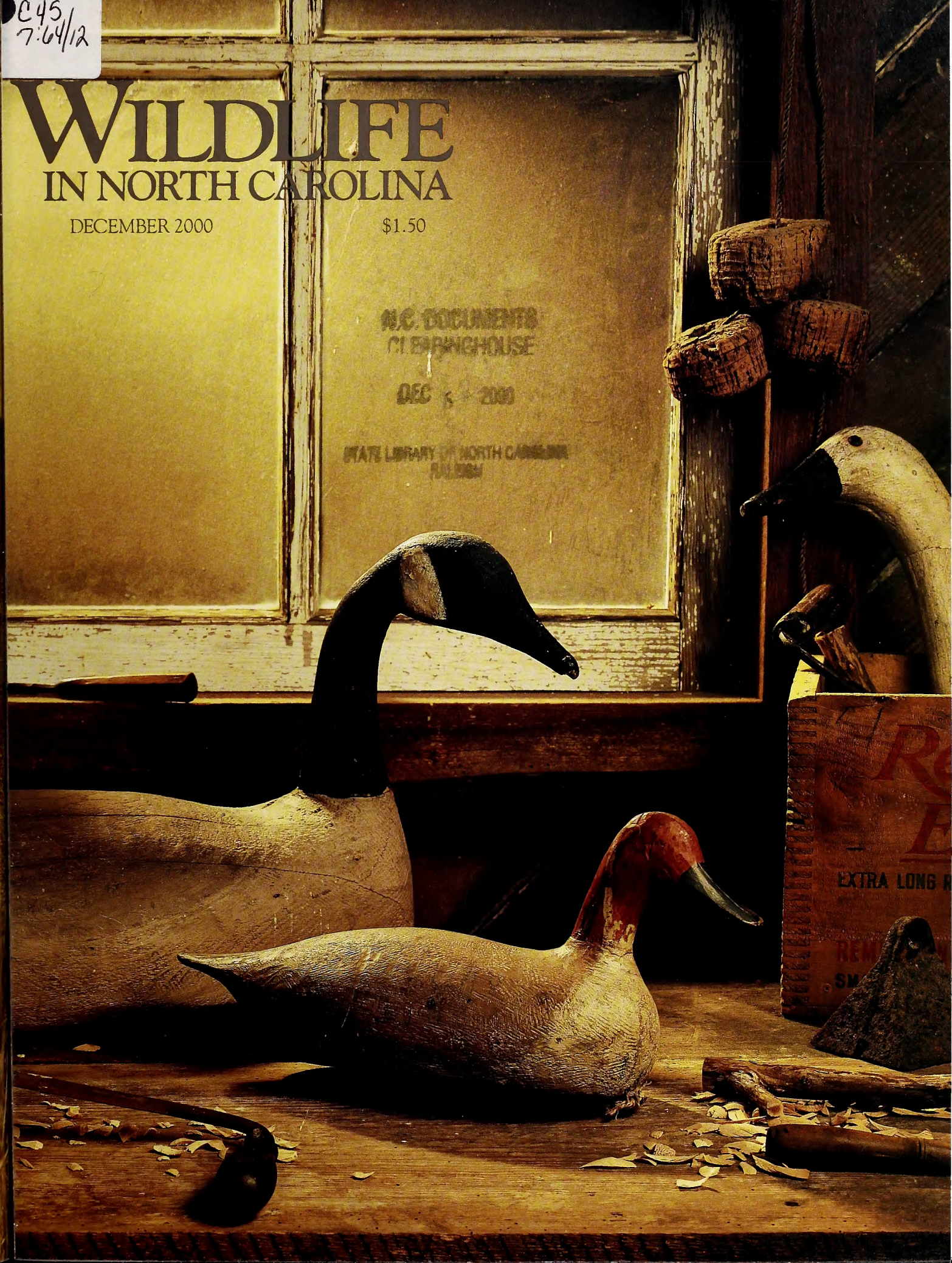

Living Large and Long

by Jim Dean ©2000

ILLUSTRATED BY JACKIE PITTMAN ©2000

Even those who aren't abnormally superstitious tend to approach the subject of longevity with some apprehension. There is always the possibility that we might be jinxing ourselves (indeed, the irony that I might not last long enough to see this in print has not escaped me). Life doesn't come with a warranty, and that's not a contractual oversight.

Years ago, an older fishing friend enduring some annoying infirmities made the remark that "Getting old is a danged poor arrangement, and a nuisance." It was the kind of darkly humorous observation Mark Twain might have made, but my friend was not trying to be clever. "You'll see," he snorted. And, of course, we all will. We just hope it's later rather than sooner.

Random luck has a lot to do with this, of course. Some of us are blessed with undiminished physical and mental faculties well into our later years while others unfairly suffer horrendous problems very early. Still, it's good news—statistically, at least—that more of us can anticipate living longer, more active lives. There is convincing evidence that we can improve the odds by avoiding or moderating habits with proven risks, scheduling an annual physical, exercising regularly, getting plenty of sleep and eating a healthy diet.

A recent study ranks North Carolinians at or near the bottom of the list in making wise choices for a healthy lifestyle, but you and I aren't dishonoring our heritage if we choose to be exceptions. There are too many fish to catch, too many dogs to follow. Indeed, a lot of folks approaching middle age—definition: that's whatever age you are, plus 10—are taking better care of themselves than any previous generation. Baby boomers, especially, seem intent on resisting geezerhood and redefining the concept of old age. Good for them.

"...my goal is to be wading trout streams when I'm 90, pound my boat through the inlets at 95, watch corks from a wheelchair when I'm 100 and remember it all fondly in my declining years."

Apparently, a lot of this has to do with attitude. Havilah Babcock understood the benefits of a joyous obsession when he wrote about his lifelong love of quail hunting in *My Health Is Better in November*. Every fall, hunting restored his enthusiasm and vigor. My father underwent the same seasonal transformation. He seemed barely able to totter out to pick up the newspaper most of the year, but come November he could hunt all day while you panted to keep up. He also surfed well into his 70s, and even now he figures he could catch a wave if he could mount a walker on his board.

Studies show that a stubborn refusal to yield to the process of aging can work wonders. We all know older folks who maintain a zest for life, substituting new interests and challenges even as their physical and mental capabilities diminish. The physically challenged take up painting, pottery, herb gardening or buy a computer. Those still fit take white-water float trips, hike modest mountains, learn to fly fish, ride Harley-Davidsons. Is that "never give up" attitude something we can learn?

One fishing buddy—a 60-plus health nut—seems to have this gift, or grit. "I may croak tomorrow," he says, "but my goal is to be wading trout streams when I'm 90, pound my boat through the inlets at 95, watch corks from a wheelchair when I'm 100 and remember it all fondly in my declining years."

One of the most youthful codgers I've ever known was my friend A.J. Johnson. One of his secrets was to surround himself with younger friends (you share their energy and they seldom die before you do). Yet, even Johnson went through a period of understandable despondency while recovering from a heart attack. He worried that he might soon have to give up his beloved trout fishing, and he frequently expressed this fear with his closest fishing buddy, Reid Bahnson (who was also his doctor).

"Bell says I'm gonna die up here on one of these creeks," Johnson told us one afternoon, speaking about one of his closest friends.

"Listen, Johnson," Reid replied in mild exasperation. "Walking these trails is good for you, but not if you worry yourself to death about it. And where the hell else would you rather eventually die than on one of these creeks? Could you choose a more beautiful spot?"

Nobody said anything for a few minutes, then Reid added, "And, besides, we'll drag your butt out after we finish fishing." Johnson laughed about that all afternoon. Twenty years later he was still laughing, and still fishing.

Another fishing companion has what may be the ultimate practical attitude towards the march of time. Mary simply refuses to wear a watch. Ask what time it is, and you always get the same answer. "It's now."

Contents

Wildlife in North Carolina

Wildlife in North Carolina is the official educational publication of the North Carolina Wildlife Resources Commission. It is dedicated to the sound conservation of North Carolina's wildlife and other interrelated natural resources and also to the environment we share with them.

December 2000 *Volume 64, Number 12*

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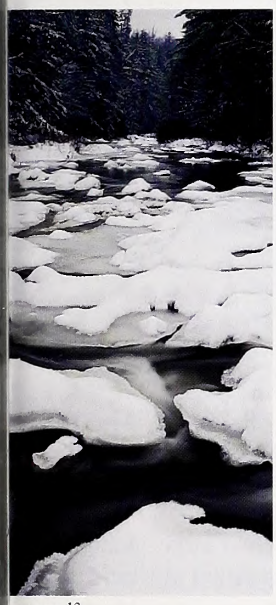

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Cover *Rough-hewn roothead decoys were designed by market hunters along the Outer Banks a century ago. Photograph by Melissa McGaw.*

Wildlife in North Carolina (ISSN 0043-549X) is published monthly by the North Carolina Wildlife Resources Commission, 512 N. Salisbury St., Raleigh, N.C. 27604-1188. Periodicals postage paid at Raleigh, N.C. and additional mailing offices. Subscription rates: one year $7.50, three years $20, lifetime $100. All foreign subscriptions are $23.50 per year. For subscriptions from foreign countries, payment **only** by U S Postal Service money order or cashier's check drawn on a U.S. bank. All orders must be prepaid. Please allow 6 to 8 weeks delivery on new subscriptions and address changes. **POSTMASTER:** Send address changes to Circulation Manager, 1711 Mail Service Center, Raleigh, N.C. 27699-1711. Address all correspondence regarding subscriptions to Circulation Manager. If you have a problem with your subscription, dial (919) 662-4377. Articles in *Wildlife in North Carolina* may represent the personal views of authors, and do not imply endorsement by the North Carolina Wildlife Resources Commission. *Wildlife in North Carolina* is available on audio cassette as a courtesy of volunteer services of the Department of Cultural Resources, Library for the Blind and Physically Handicapped, Raleigh, N.C., (919) 733-4376. **The N.C. Wildlife Resources Commission is an equal opportunity agency.**

Ice Water in Its Veins

written by Jeff Beane ©2000
illustrated by David Williams

A bone-chilling rain pelted the Blue Ridge. A Yancey County farmer had just finished another long day's work. Shivering as he hurried from the barn to the house, he heard a strange sound issuing from the woods below his pasture. The hoarse *craw-caw-cawk* sounded like a hundred chickens or ducks holding court in his red maple swamp. The farmer recalled that once before, at about the same time of year, he had heard that sound. This time, his curiosity piqued, he donned raincoat and boots, grabbed a flashlight, and headed for the dark wetland. The noise stopped. Sweeping his flashlight beam over the dark, shallow pool, he at first saw nothing, and then frogs—handsome, brown frogs with dark masks, floating on the surface, some clasped together in pairs, scattering as his light hit them. It was breeding time for *Rana sylvatica*—the wood frog.

Cold-weather creatures, wood frogs range farther north than any other North American amphibian, occurring above the Arctic Circle in Alaska and Canada. In North Carolina, they occur throughout most of the Mountains and western Piedmont. A few years ago, biologists were surprised to discover isolated populations in Hyde and Tyrrell counties. That region of the Coastal Plain—mostly gum swamp and pocosin—is far from typical wood frog habitat, but it does contain remnant hardwood stands, which harbor several other more typically northern species, perhaps all Ice Age holdovers.

Wood frogs may be tan, brown, brick red or pinkish, with a dark brown mask extending backward from the eye. Females are often larger and more colorful than males. Adults are terrestrial, inhabiting moist woodlands. Like the majority of frogs, they eat mostly live insects, especially beetles and flies. Great jumpers, wood frogs may be seen crossing mountain roads on rainy nights, often clearing the pavement in one or two long, bounding leaps.

In North Carolina, wood frogs breed in winter—usually in February, but occasionally as early as late December or as late as March. Like many amphibians, they are fish-intolerant, requiring ephemeral woodland pools or other shallow wetlands. Explosive breeders, they enter and leave the ponds quickly, their entire breeding season often lasting only a few days. Their large, globular egg masses, each containing several hundred eggs, are usually attached to vegetation just beneath the water's surface, and are sometimes deposited in huge clumps, covering an area several feet across. This communal egg laying helps protect some eggs (those nearest the center) from surface freezing or from desiccation if the pond dries up. They hatch in a week or two and the tadpoles transform in about six to eight weeks.

By breeding in winter, the wood frog avoids some predators and eliminates competition from other frogs, but the season carries its own risks. Frogs, being poikilothermic, or "cold-blooded," are largely at the mercy of the elements. Most species winter underground, beneath surface litter, or in mud on pond bottoms, insulated from freezing temperatures. Winter breeders risk getting caught out in a lethal cold snap. In such a situation, a wood frog plays a "cool" trick. If its extremities begin to freeze, glycogen stored in the frog's liver is converted to glucose and is quickly transported into its bloodstream. The concentrated glucose acts as antifreeze. But wood frogs not only resist freezing, they can actually survive with over half their body water converted to ice. In extreme cold, a wood frog may freeze nearly solid (taking about 24 hours to do so) and survive in that condition for days, with circulation, respiration and other essential body processes shut down. Some other amphibians—including spring peepers and gray treefrogs—and a few other vertebrates can similarly withstand freezing. How they manage this has been the subject of much research. Apparently, their built-in antifreeze system prevents the formation of ice crystals, which would rupture cell membranes and cause fatal tissue damage. Studying freeze-tolerant animals may someday have applications for preventing frostbite in our own species.

Whatever the season, Nature takes care of her own. Every winter in our mountains, you can look forward to witnessing breeding aggregations of a handsome, sylvan frog with a raspy, clucking song in its heart and ice water in its veins.

Jeff Beane is a curator of reptiles and amphibians at the N.C. State Museum of Natural Sciences in Raleigh.

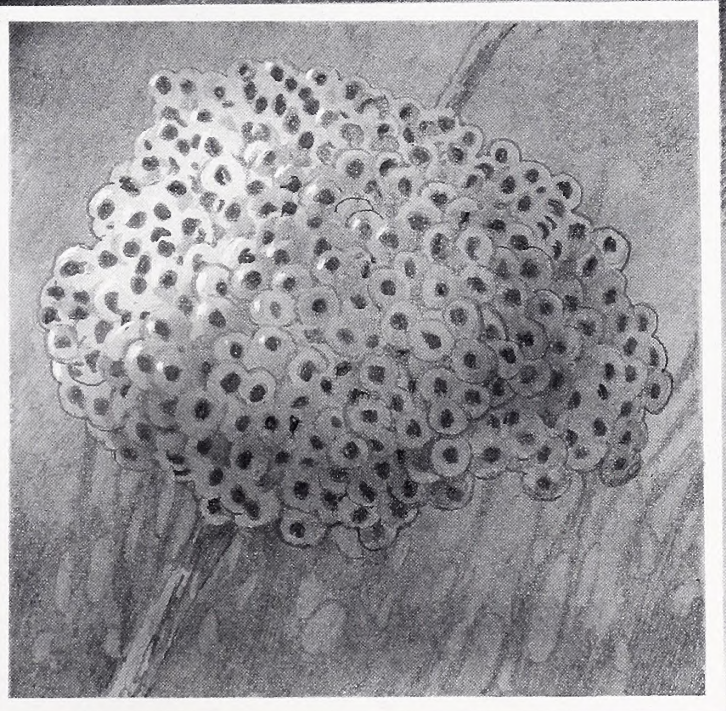
Other Reading

- John Himmelman, *A Wood Frog's Life* (Children's Press, 1999).
- John L. Behler and F. Wayne King, *The Audubon Society Field Guide to North American Reptiles and Amphibians* (Alfred A. Knopf, 1985).
- Roger Conant and Joseph T. Collins, *A Field Guide to Reptiles and Amphibians, Eastern and Central North America, Third Edition, Expanded* (Houghton Mifflin Co., 1998).
- M. C. Dickerson, *The Frog Book* (Dover Publications, 1969).

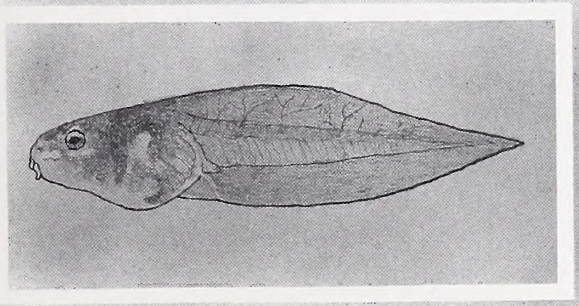
Surfing the Web

- These websites contain images of, and general information on, wood frogs.
  Address: http://www.npwrc.usgs.gov/narcam/idguide/wood1.htm
  *Address:*http://animaldiversity.ummz.umich.edu/accounts/rana/r._sylvatica$media.html
  *Address:*http://think.ucdavis.edu/~yamara/ucdlife/traditions/critters/rana.html
- This website contains information on freeze tolerance in wood frogs and other animals.
  Address: http://www.naturenorth.com/winter/frozen/Ffrozen.html
- Visit these websites to hear a wood frog's call.
  Address: http://www.cmnh.org/research/vertzoo/frogs/sylvatica.html
  Address: http://www.mbr-pwrc.usgs.gov/wifrog/wood.htm

Wood frogs breed *in woodland pools during winter rains, often gathering in large numbers. Their clucking call has little carrying power. They survive freezing temperatures by regulating glucose levels in their blood, and they can actually endure freezing of their tissues.*



Wood frogs lay large, *globular egg masses. Thick jelly protects the eggs from freezing and desiccation. Egg masses are often deposited close to one another, affording further protection.*

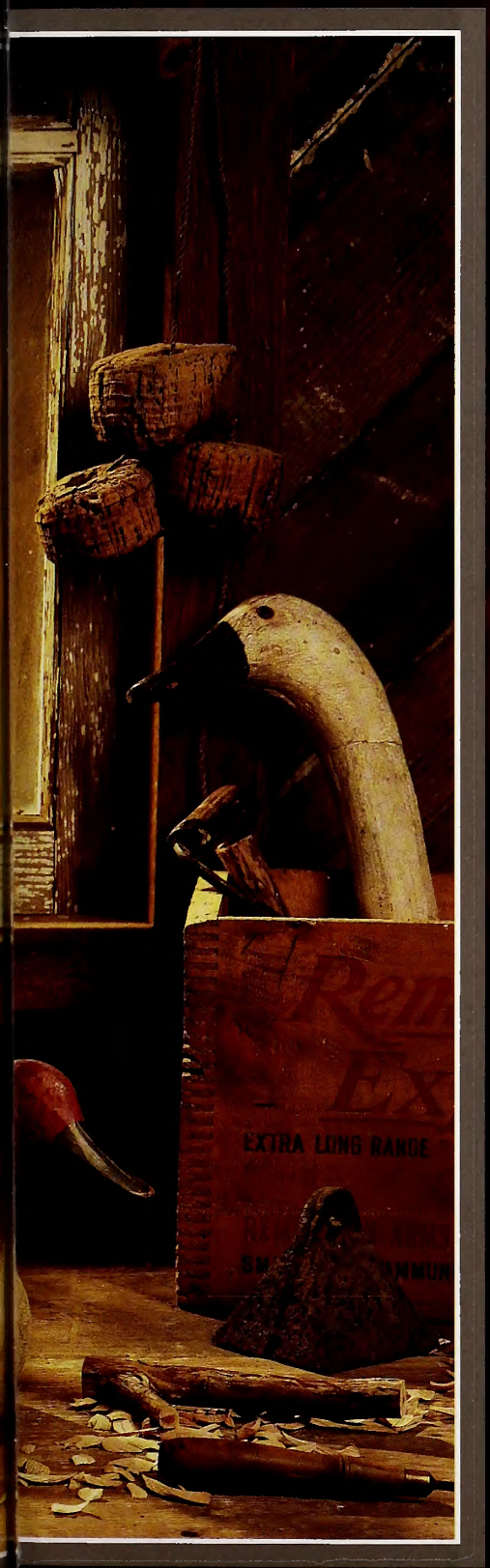


After the wood frog's *eggs hatch, the tadpoles transform in about six to eight weeks.*

In North Carolina, *wood frogs range throughout most of the mountains and foothills. Isolated populations in Hyde and Tyrrell counties indicate a historical distribution that was once more widely connected.*

North Carolina's

Rootheads



Rough-hewn and homely, roothead decoys were used in great numbers by 19th-century market hunters along the Outer Banks. They're collectors' items today.

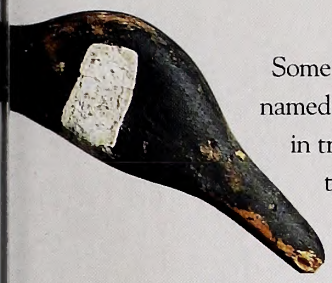
written by Kroghie Andresen and A. Everette James Jr. ©2000
photographed by Melissa McGaw

What is it about old, wooden decoys that holds such fascination? Shaped blocks of wood, chipped paint, oxidized lead weights and rotting cords—these creations were once simply tools, and for a long time they were valued as just that. But some now fetch thousands of dollars, and the newer reproductions adorn the homes and offices of people hundreds of miles inland. The demand for such creations has spawned an entire cottage industry throughout the barrier islands, making full-time jobs out of what once were seasonal hobbies. Could it be the modern appreciation of ancient craftmanship—sharp steel against soft juniper? Or is it the tangible link to the days of wooden boats and iron men braving Nor'easters to take ducks to market? Whatever the reason, these decoys bear testament to the powerful hold the waterfowling heritage still has over the marshes and sounds of eastern North Carolina.

Canada Goose, circa 1937
Percy Carawan, Mattamuskeet

Brant, circa 1920s
George Washington O'Neal
Ocracoke Island

Pintail Drake
circa 1930s
Allen Tillett
Kitty Hawk Village



Some of the most sought-after older decoys are the rootheads, so named because the carver used naturally occurring curves found in tree roots and branches to fashion the heads of decoys. The trained eyes of carvers could find unlimited possibilities—swimming waterfowl, feeding waterfowl, alert or even sleeping waterfowl—in the gnarled shapes of these trees.

The roothead construction was also a durable way to carve decoy heads. Because hunters grasped the head and upper neck of the decoy to pick it up, many of them were broken under the weight of the waterlogged body. Additionally, the bills bore the full impact of the decoy being hurled into the boat or being stepped on during the choppy rides.

Canada Goose, circa 1910
Big Ike O'Neal
Ocracoke Island

But hunters used a number of measures to address the problem of neck fractures, including reinforcement with dowels or nails driven the length of the decoy's neck. The most interesting and structurally sound method was to fashion the head and neck from the extension of a limb protruding from a small tree branch. The limb would bend without breaking because of the continuous grain running through the natural growth of the tree.

Most of the roothead brant and goose decoys used by the market hunters along the Outer Banks were carved before 1918. The hunters here also carved and used some roothead redheads and pintails, and they even used roothead shorebird decoys. These decoys were common because about 20 species of shorebirds that frequented the beaches and soundside marshes around these barrier islands also were hunted before 1918. The roothead construction in shorebird decoys was very effective in reproducing the many head shapes and the long narrow bills of the yellowlegs, willets and curlews. The limb extensions could easily replicate the form and dimensions of the actual species.

Each waterfowl decoy had a ballast weight that self-righted the decoy when it was thrown into the water. In the Ocracoke area, the traditional weight was handmade by the carvers. These weights looked like the yolk of an egg and were nailed to the bottom of each decoy.

Historians credit the Outer Banks hunters from Portsmouth Island north to Hatteras Village with developing the construction and use of roothead decoys sometime in the mid 19th century. Ocracoke Island was the center of this industry, and by the turn of the century there were more than 20 market-hunting operations on the island using roothead decoy stands.

Roothead decoys have been found in other pockets along the eastern coast of the United States and Canada. However, the North Carolina coast has produced the largest number of roothead decoys, so it's possible that they originated here. We know that the inhabitants who settled the remote barrier islands and made a living on the water were self-sufficient scavengers who used whatever materials were available. Hunting conditions required durable wood and decoy construction. This generally called for juniper or cypress, but the thrifty islanders often used old telephone poles, masts from shipwrecks or juniper logs washed from boats bound for northern ports.

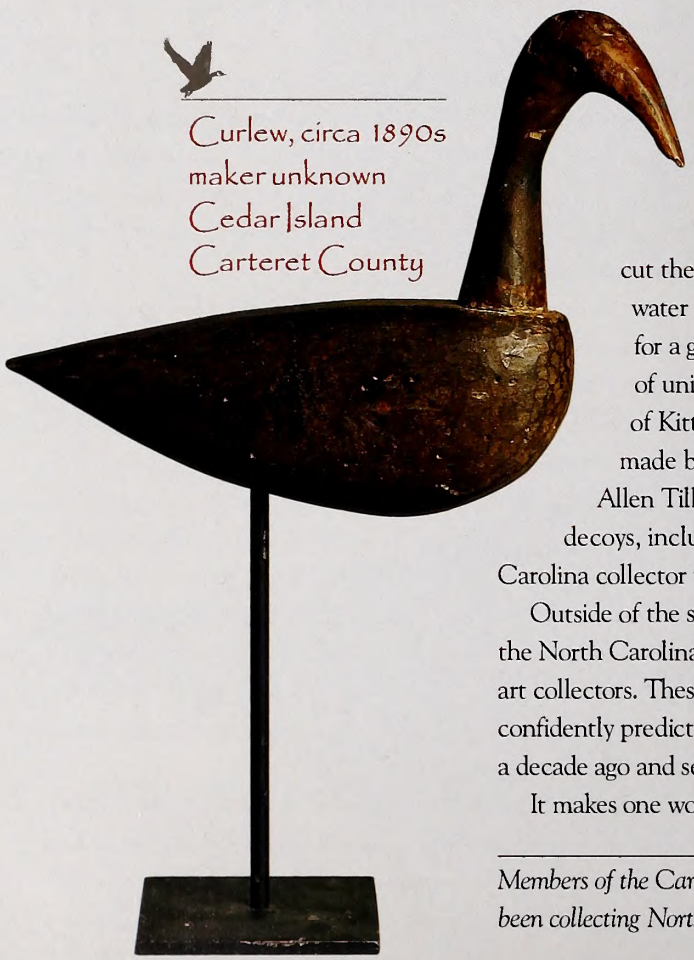
In most cases, the market gunners made between 200 and 500 decoys to rig out their sink box blinds or "batteries." Decoys were made to be functional. Little effort was spent carving intricate details in the decoy form. The paint patterns were simple but effective in attracting ducks flying over the large coastal sounds. Hunters used numerous decoys to

replicate the large rafts of waterfowl that frequented the Outer Banks. The weight of several hundred wooden brant and goose decoys was several thousand pounds. The hunters usually had to sail or row a small shallow bottom skiff full of decoys in stiff winds to get to their favorite hunting spot before their competitors.

The residents of Ocracoke Island can be credited with changing the style and size of decoys that were used and carved by their neighbors in Currituck County, some 100 miles to the north. Luther Parker, a famous market hunter from Knotts Island, told Harry M. Walsh, the author of *Outlaw Gunner*, how the use of large battery decoys in Currituck County evolved around 1900. "One winter the Ocracoke boys came up with their large brant decoys," Parker said. "They just painted them like redheads and started doing better than we did. After that, we all went to the larger decoys because they were more visible to the ducks and hid the box better."

These brant decoy stands also had a good number of the large roothead goose decoys that were extremely effective in the open water. The roothead decoys from Ocracoke changed the style of the Currituck decoys for many years to come.

The roothead carvers from North Carolina aren't as renowned as many of their decoy carving counterparts. Carvers such as Gary Bragg, Charlie McWilliams, Charles Warren Garrish, George Washington O'Neal, Ike O'Neal, Lawrence Howard, Frank Gaskill, Jones Williams, Gamael Balance, Walter O'Neal, Stacy Howard, Ben Fulcher, John Wallace Salter and Ben Salter should be widely known within the collector community. But the truth is that most decoy enthusiasts only recognize a few roothead carvers' names like Gary Bragg or Big Ike O'Neal. Roothead decoys at auctions are usually incorrectly identified as being made by one of these two men. This has the effect of further confusing aspiring decoy collectors.



Curlew, circa 1890s
maker unknown
Cedar Island
Carteret County

One notable roothead carver lived across Pamlico Sound from Ocracoke Island in the Lake Mattamuskeet area. In the 1930s, Percy Carawan carved a large stand of more than 100 roothead duck, goose and swan decoys. The goose and swan decoys are the most numerous and most famous. They were truly roothead decoys since the heads were made from the roots of black gum trees. He would cut the roots out of the local swamps during the hot summer months when the water would dry up. The many shapes found in these root configurations made for a great variety of head and neck positions for his geese and swans. The lack of uniformity in roots makes every decoy look unique and realistic. The village of Kitty Hawk also produced some roothead treasures. The roothead decoys made by Alfonso Tillett and the roothead duck decoys made by his older son, Allen Tillett, are stunning. All of the members of the Tillett family made roothead decoys, including the other sons of Alfonso, Avery and Clay. Lucky is the North Carolina collector who can find one of these.

Outside of the small, close-knit community of southern decoy collectors and specifically the North Carolina collectors, the roothead decoys also have attracted the attention of folk art collectors. These collectors are willing to pay substantial prices for the objects. One might confidently predict that the roothead decoy that sold for several hundred dollars at auction a decade ago and several thousand today will bring much more in the future.

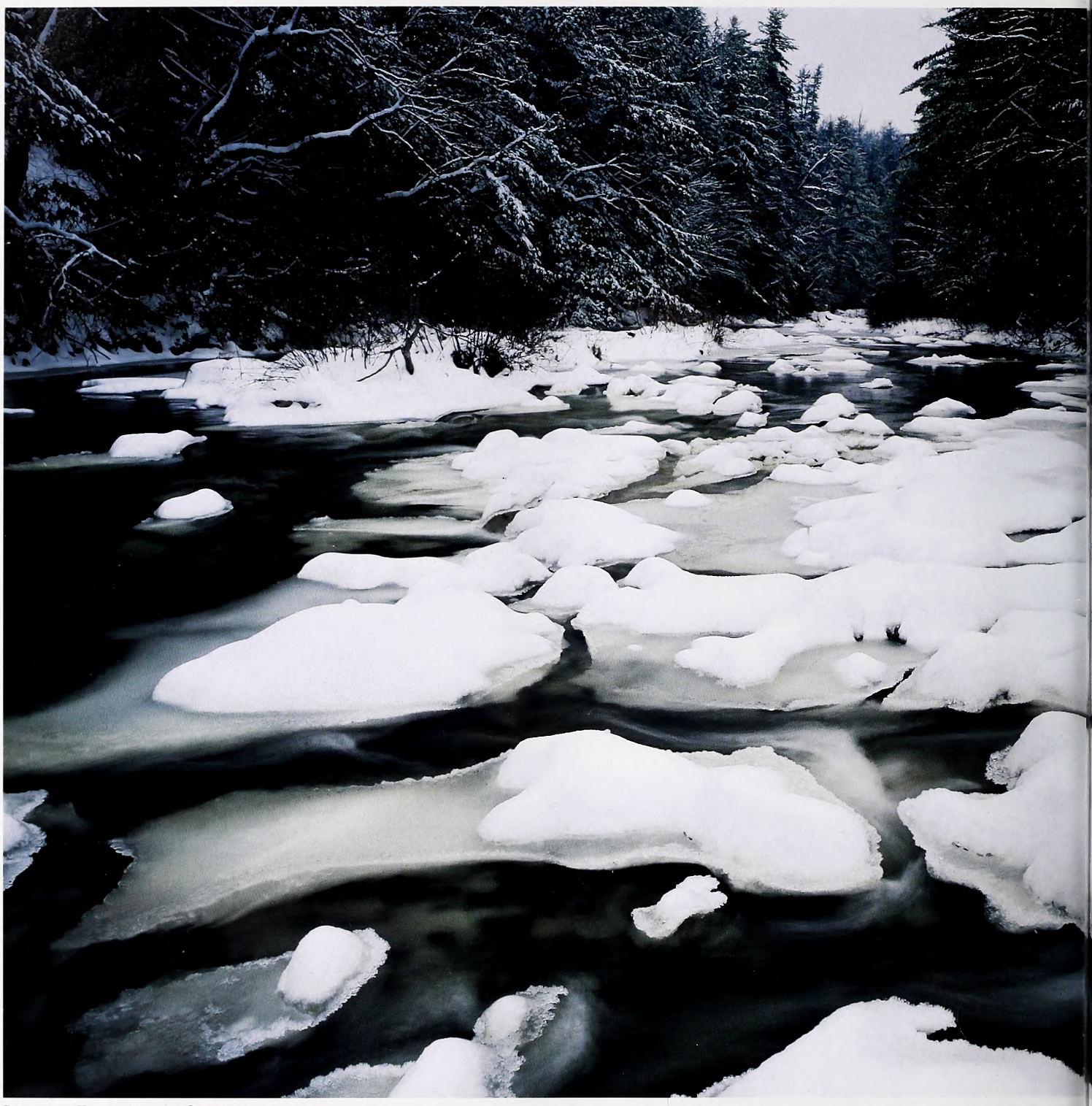
It makes one wonder what the simple carvers of old would have thought about that. ⊠

Members of the Carolina Decoy Association, Kroghie Andresen and A. Everette James Jr. have been collecting North Carolina decoys for more than 20 years.

Brant, circa 1920s
Walter O'Neal
Ocracoke Island

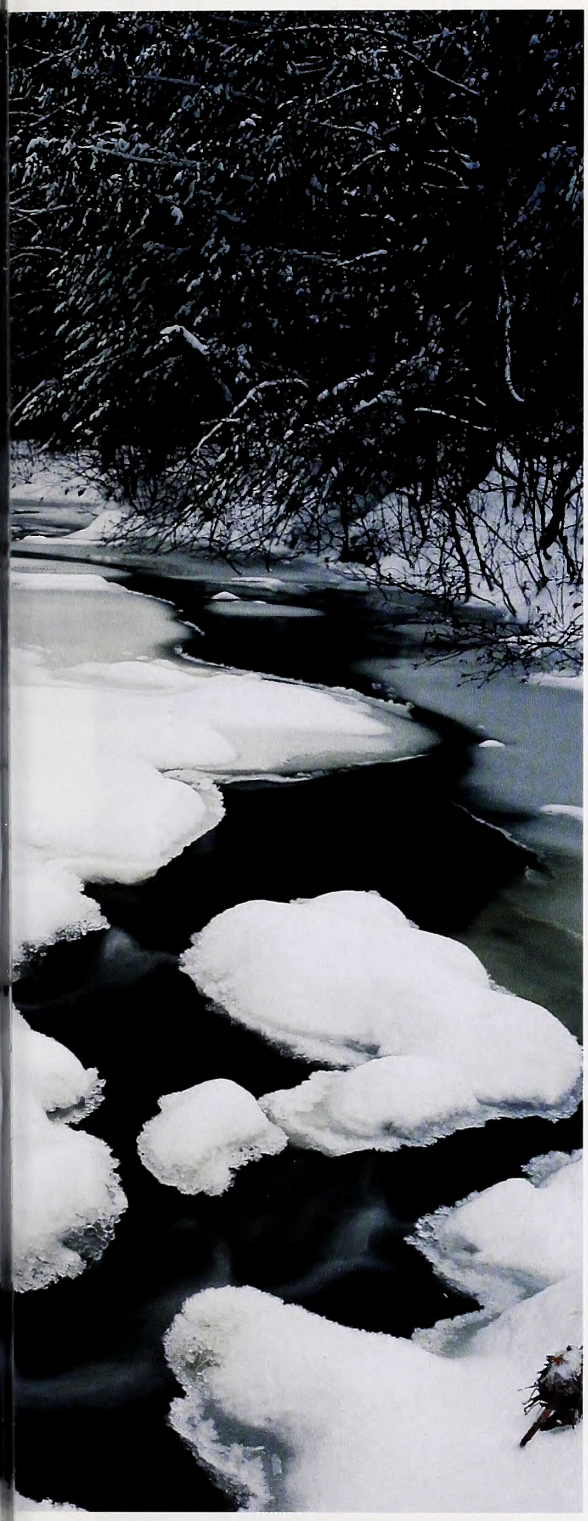
Canada Goose, circa 1920s
maker unknown, Ocracoke Island

Widgeon Drake, circa 1930s
Allen Tillett, Kitty Hawk Village



LINVILLE RIVER, AVERY COUNTY

REFLECTIONS



LEAFLESS TREES, LEADEN SKIES AND A HINT OF SNOW IN THE AIR—THAT'S WINTER FOR MOST OF US. FOR PHOTOGRAPHER GEORGE HUMPHRIES, HOWEVER, WINTER IS A VIRTUAL FEAST FOR THE EYES.

photographed by George Humphries ©2000

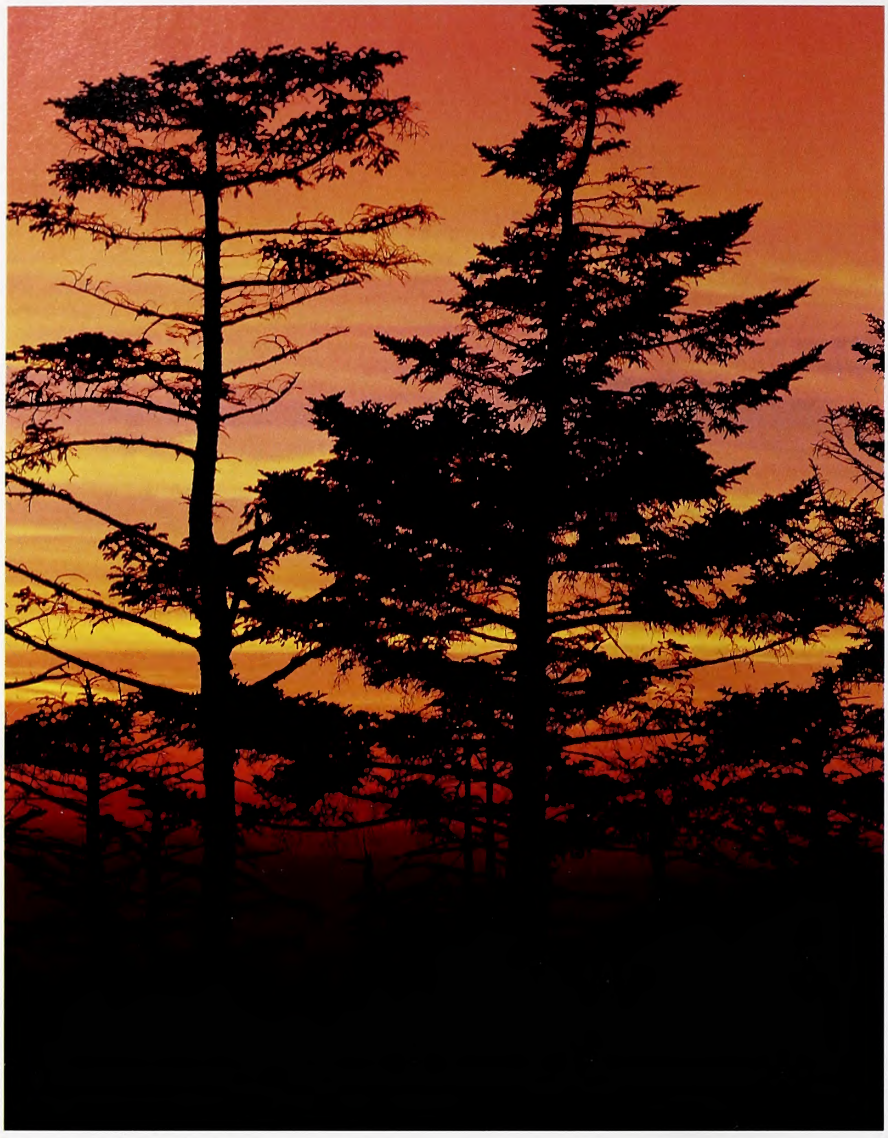
OF WINTER

BLACK BALSAM KNOB, HAYWOOD COUNTY

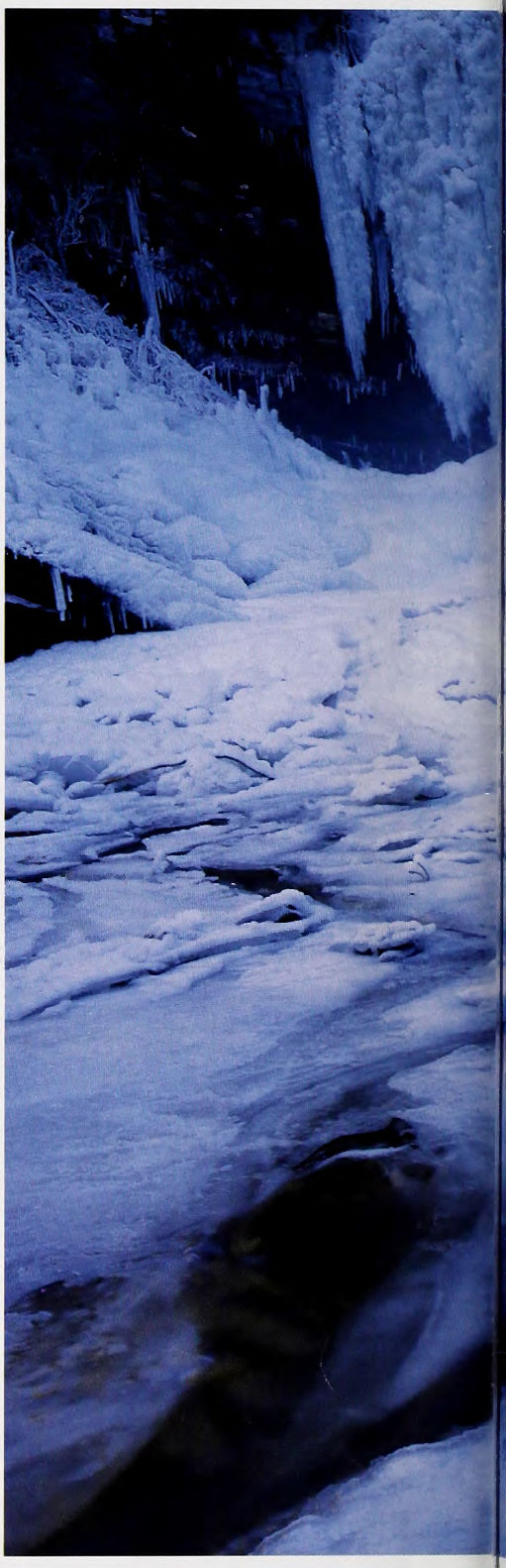
THE FRENCH BROAD RIVER AT ITS CONFLUENCE WITH THE SWANNANOA RIVER, BUNCOMBE COUNTY

EVEN IN A BARREN WINTER LANDSCAPE LIFE CONTINUES TO STIR,

AND THERE IS ALWAYS COLOR TO SURPRISE THE EYE.



MOUNT MITCHELL, YANCEY COUNTY



WALKER FALLS, BUNCOMBE COUNTY

LOOKING GLASS FALLS, TRANSYLVANIA COUNTY

BIRDSONG IS A DISTANT MEMORY NOW, BUT ICE CRYSTALS

TINKLE LIKE BELLS IN THE THIN AIR.

Winter Tales

❄ ❄ ❄

TWO STORIES ABOUT HUNTING, DOGS AND THE FELLOWSHIP OF DAYS SPENT AFIELD.

THE LAST HUNT

IT'S THE MIDDLE OF WORLD WAR II, AND A SOLDIER HOME ON FURLOUGH TAKES HIS DOG ON A HUNT THAT WILL BE ETCHED IN HIS MEMORY.

written by John W. Duggins Sr. ©2000
illustrated by Chris Armstrong ©2000

Twilight had given way to darkness on that November evening in 1944. The bus was too hot and I was roasting in a woolen Army uniform, trying to hold on as we lurched around curves. The bus was packed like always during the war, dense with cigarette smoke and reeking of diesel fumes. There was standing room only, but I was almost home.

We jolted to a stop in Greenville, Tenn., just across the state line from Marshall in the mountains of western North Carolina. I slung a knapsack over my shoulder and stumbled out. White clouds raced overhead and across Main Street a winter moon appeared suspended from the steeple of the Presbyterian Church. A yellow flicker of streetlights reflected from the hole in the ancient brick front where a Civil War cannonball lodged.

I forgot about being tired as I sucked in the cold air. In my growing up we never thought about our little town in the foothills of the Southern Appalachians as having mountain air, or any other kind of air for that matter, but after being in the Army camp in the Deep South I suddenly appreciated the air of back home.

Home. True, I was only on furlough, for it was wartime and the world was in flames. After 10 days I had to go back, but for 10 days I was home and just in time for the hunting season.

Childhood memories rushed back as I climbed West Church Street. It was deserted now except for lights of infrequent cars, and the houses were dark and quiet. I passed the Fox Hospital where as a high school boy I had my tonsils removed after saving the necessary $52.

Up, up Highland, up the steep grade to our house at 501 West Church St. The houses were dark, for back then 10 o'clock was late. The kitchen door wasn't locked, though, because people in those days didn't lock doors. The swing was still there on the back porch, as well as the screen door with its sagging wire.

I slipped in quietly so as not to awaken the old folks. Almost overnight our family of 12 had been scattered by the circumstances of war, and only Mom, Dad and Baden, the youngest, were left. Switching on the overhead light revealed enough food in the warming closet of the old wood stove to feed nine boys and a girl, like always. Habits of long years don't break easily, and Mom still cooked for 12, even if we weren't there. She couldn't adapt to small-scale cooking, or maybe she thought her boys might come

home that night, hungry like always.

From beside the still-warm stove an old dog raised a sleepy head and eyed me reproachfully. "Where've you been, Bud?" his eyes seemed to be saying. "Don't you realize that the hunting season is open?" His tail thumped the kitchen floor, softening the reproach.

I sat down at the kitchen table, nibbled at the home cooking and reminisced.

Wimpy was a bird dog—what knowledgeable hunters call a "dropper" because his mother was a setter and his father a pointer. He had the short hair of a pointer but the black spots of a setter. Uncle Levator over at Clinton trained dogs for field trials, and as Dad made his traveling-salesman rounds he and my brother Ray stopped over there to spend the night at Mom's old home place.

"How'd you like to have a nice puppy, Ray?" Levator had said. Ray couldn't believe his ears.

The pup was an unwanted, unwelcome indiscretion on the part of a pedigreed setter bitch due to be entered in the autumn trials. She had accidentally bred to a pointer and at the wrong time of year to boot. At birth only one pup had been kept, and that one only to keep the mother from having milk fever. Now Uncle Levator was impatient to be rid of it,

too, for it had no place among his fine show dogs.

Ray came home in triumph with his new puppy, the first and only dog he ever owned until he was grown and gone from home.

He was 11 and I nine, and we knew nothing about bird dogs and that they have to be trained. We only knew that we were the owners of a bird dog, and that hunting season was open.

Away we went, through brown fields of sedge and sassafras to a place where we knew that a covey of quail roosted. The pup was so small that he rode in the side pocket of Ray's hunting coat, a relic cast off by older brothers. The pup's head stuck out and bobbed up and down, and once it went to sleep.

Seasoned hunters will think this was an improbable outfit to put afield for quail—two ragged little boys, one worn-out hunting coat, a 10-week-old puppy and a single-shot .22-caliber rifle. It does seem so, unless you remember that puppies grow fast, and little boys with .22s become big boys with shotguns almost overnight.

We took the puppy out of the coat pocket and put him on the ground. He sniffed the air, took a few wobbly, uncertain steps and then froze in a perfect point. I swear it to be true. He had so many generations of bird dog instinct bred into him that he pointed perfectly the first quail covey he encountered, a pup so tiny that he had to be carried to the field and helped over fences. We weren't the least bit surprised. After all, Levator had told us that the pup was a bird dog, and we knew that bird dogs are supposed to point quail.

The next part is equally improbable. As the birds thundered into the air, Ray fired the rifle wildly into the exploding covey, and a fat rooster quail fell to the ground. It was pure chance. Most hunters miss a flying quail even with a shotgun. It happened, though, and a legend made his debut.

Wimpy. Such an undignified name for a dignified, courtly aristocrat. That was the name Ray gave him though, and it stuck with him for the 13 years that he was a member of our family. He never had professional training, but we got a book from the library on dog training. This dog was perceptive, eager and willing. Willing to search for an hour to retrieve the stuffed sock sewed to a quail wing that was the dead bird. Breaking him from pointing butterflies and sparrows was easy—rabbits a little harder because he knew that we liked to eat rabbits, but still easy. Wimpy learned to heel, to follow hand instructions. He grew to be a big, far-ranging hunter, cutting a stylish figure as he flashed back and forth, quartering through autumn fields. At the far end of a field, a white spot in the distance, he would stop and look back for hand signals. He covered ground so rapidly that only boys could keep up, and he really found quail.

Shotgun shells were a problem at first, for they cost three cents each, and often during the Depression they just weren't available to us for lack of money. As fame of the dog spread, however, shells became easier to get. Wealthy town hunters gladly furnished shells to hunt with us, or in exchange for quail for their table.

He sniffed the air, took a few wobbly, uncertain steps and then froze in a perfect point. I swear it to be true.

Now I sat at the kitchen table remembering. The old dog remembered too, and his tail thumped the floor whenever I looked toward him. Perhaps he was remembering that summer day when all the family laughed at his embarrassment as a belligerent mockingbird drove him out of his own backyard. Or the time when he and I went out on a Sunday afternoon before the season opened to scout coveys for later hunting. We walked out of the woods into a clearing and stumbled onto a group of sinister-looking men. They were sitting in a circle on the ground, drinking moonshine and gambling, all against the law back in those days. I was scared. There looked to be about a hundred of them, though 15 or 20 was probably more accurate. Hardened, vicious, dissipated-looking characters, they stared suspiciously at me, muttering oaths. Some were drunk, and anything could have happened. What did happen was that Wimpy mistook the circle of men sitting on the ground for a nice collection of tree stumps. He ambled over to the nearest gambler and did what male dogs do to tree stumps. A roar of mirth burst

from the circle, and the tension was broken.

"I know this boy, and he won't tell on us," a big man said. I didn't wait for an answer. I beat it back into the woods, followed by the unconcerned bird dog diplomat.

Other memories flooded back as I looked around the old kitchen at the wood stove and the rickety sink in the corner. I remembered how good cold water could be when as a small boy I came running in after school, thirsty and hot, to hold my head under the faucet and drink.

The dog was a pup then, and now he was old. A thirsty schoolboy and a pup; an old dog and a soldier home on furlough. We were about to have our last hunt together.

I HAD TO RANSACK THE HOUSE FOR SHELLS the next morning, for there were none to be bought during the war. A careful search revealed a few, in groups of twos and threes, stuck back here and there in vases and boxes and drawers. It was evident that it had been a home of hunters.

Outside the grass was white with frost, and a skim of ice glistened on puddles. Wimpy's tail was shaking his entire body as I came out with the shells and the old double 20-gauge. He was having trouble getting his feet to go in the same direction, he was in such ecstasy. The car was a blue 1939 Plymouth four-door sedan, and it looked like several boys had learned to drive in it, like it had been wrecked a couple of times, like the speedometer had been rolled over a couple of times—all of which was true. I scraped the frost from the windshield, carefully missing the "A" sticker. Gasoline was rationed, and holders of an "A" sticker got almost no gas. It was a good car in spite of appearances and started easily. We drove out into the frosty countryside to the home of old Preacher Shealey in the St. James community.

He was an ardent hunter, still able to walk down many younger men at 78. A big, ruddy-faced man, he talked in a low-voice-to-the-ear manner and was absent-minded. His parishioners told that they went to church one Sunday and the preacher was absent. Preacher Shealey had gotten up, noted the shower that had fallen during the night, heard squirrels barking in the woods and decided to go hunting. Not until he heard the church bell ringing did he realize his error. Fortunately, the church was only a couple of fields away. A few minutes later he emerged serenely in his clerical robes, only God and him the wiser, he thought.

Preacher kept what he said was a bird dog. The dog was big, belligerent and brindled. In my opinion, he was of doubtful ancestry; he was also a house pet and jealous of other dogs.

We took to the fields, the old dog ranging eagerly far ahead, the brindled dog walking along with his master. The preacher hummed bits of a favorite hymn, his dog rumbling angrily and the hackles rising on his back.

"Now Jack, I'll take a switch to you if you don't improve your manners!" the preacher said. Jack ignored the halfhearted warning.

Just then Wimpy skidded to a halt, frozen on point. We hurried up, but the brindled dog,

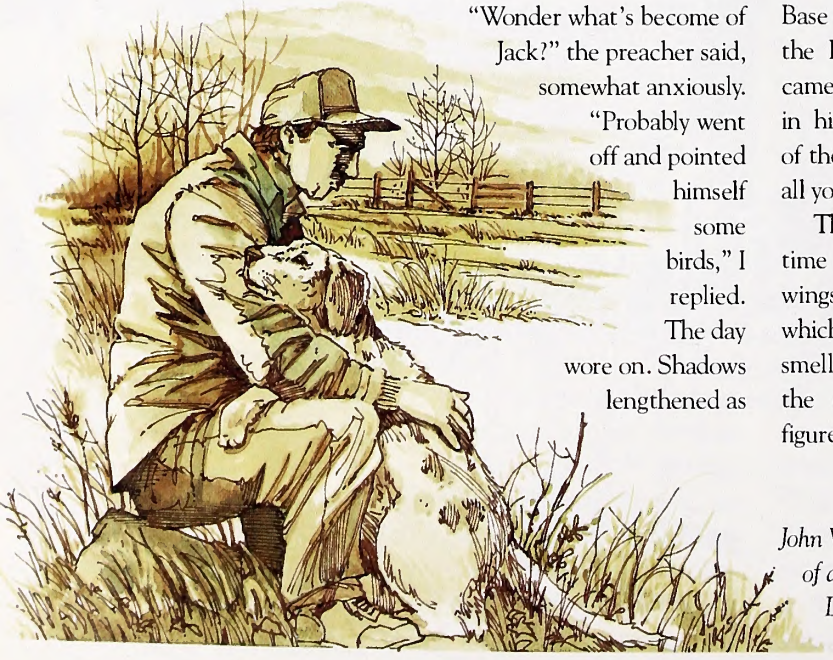
instead of honoring the point, jumped in and flushed the birds. The preacher didn't have time to shoot, but I managed to get one bird that Wimpy retrieved and proudly dropped in my hand.

In 1944 we still had fields of brown sedge, sassafras sprouts, blackberry and tangle brier. There were piney woods where fragrant breezes blew all day, weathered split-rail fences and ramshackle barns. I made the most of it on this glorious autumn day.

The pattern was set for the rest of the day—one dog old, wise and competent, the other young, strong, stupid and jealous. For each broken point Preacher Shealey clucked disapprovingly and said, "Jack, what in the world has gotten into you?"

About 2 o'clock fate caused Wimpy to point with me nearby and Preacher on the far side of a patch of woods. I stood motionless, savoring the moment—the blue sky, autumn leaves, crisp air and the beautiful dog like a statue, on perfect point. It was a scene that I shall always remember.

Then a streak of brindle-brown shot into the clearing. The jealous dog was so intent on breaking Wimpy's point that he didn't even see me. He charged right into the toe of my heavy Army boot which I had carefully aimed at the tender end of his nose after a day of pent-up frustration. Jack went yipping over the ridge and was seen by us no more that day.



"Wonder what's become of Jack?" the preacher said, somewhat anxiously.

"Probably went off and pointed himself some birds," I replied.

The day wore on. Shadows lengthened as the sun slipped behind brown-clad ridges, and the wind took on a wintry edge. The hunt was over. Old Wimpy had put everything he had into it. He had probably known it was his last, though with the thoughtlessness of youth, I had not. He performed flawlessly now that the other dog was gone, and there were seven birds in my coat and four more in the preacher's. He pointed, quartered, turned, headed-off, pointed, retrieved. But now his 13 years began to tell. He was limping now, and he walked, slower and slower, pointing one last time. Up came a single, to fall before the preacher's gun.

"Here" I said, handing my gun to the preacher. There were tears in my eyes as I picked up the dog just as I had on that first hunt years before, when the world was at peace and old dogs were puppies and boys had wings for feet, when our horizon was bounded by autumn fields and quail coveys thundered up on crisp November days.

I carried Wimpy to the car and lay him on the front seat.

"You ride in the back, if you don't mind, Preacher," I told my companion.

When I got home, Hertha, my new wife, and my parents were waiting for me with troubled faces. "All furloughs canceled —report to unit at once," said the telegram she held up for me to read.

MONTHS LATER, TO HARMON AIR FORCE Base on the island of Guam, headquarters for the B-29 bombers of the 20th Air Force, came a letter from home. "Old Wimpy died in his sleep last night—just like a member of the family. He never did get used to having all you boys gone."

Those were the good years, the bittersweet time of growing up—when boys stretch their wings and learn to fly. They were years in which I savored the feel of a favorite gun and smelled the good smells of autumn, as out in the distance flashed the black-and-white figure of a champion. ⊠

* * *

John W. Duggins Sr. is a "semi-retired" owner of an electronics business in Greeneville, Tenn. During World War II, he and eight of his brothers served in the armed forces.

SWAN MUSIC

THE NIGHT BEFORE AN ANNUAL DUCK HUNT, WITH THE MILKY WAY GLOWING IN THE INKY SKY, THREE FRIENDS ARE SPELLBOUND BY SWANS.

written by Clyde Sorenson ©2000
illustrated by Chris Armstrong ©2000

It's the middle of December, mid 1980s, and bitter cold for eastern North Carolina. Doug, Mike and I have just polished off a big meal of fried oysters and all the fixings at the small restaurant on the north end of the causeway at Lake Mattamuskeet. We're headed back to the spartan-but-comfortable motel at the south end of the causeway where we will be spending the night. To the west, a brilliant orange glow reflects off the still surface of the lake; to the east, Orion's Belt climbs up from the horizon with a million other laser points. We stop at each of the causeway drains to look at the little wads of ducks silhouetted by the sunset. Approaching the south shore, we notice that the lake surface is punctuated by the wakes and turtle-backed forms of more and more swans. We reach the big pines at the shore and turn into the motel parking lot.

We're duck hunting tomorrow. Mike starts a Ph.D. program in Wisconsin in the spring, and this will be his last hunt with us for a while, so this hunt is a farewell celebration of sorts. Now if we had common sense, we would try to get a good night's rest. However, duck hunters by definition have little if any

sense, and anticipation of the big hunt is gnawing at all of us. Maybe what we ought to do is stroll out on the causeway a bit and listen to the ducks and geese; some night air might be good for us. We don our hunting coats and hats, grab our calls (who knows why—it just seems like a good idea) and head out the door.

The sun is completely gone now, and the cold is biting. It is absolutely still and a full moon has risen. The three of us amble up the causeway toward the lake.

The moon is so bright you could read a book. As our eyes acclimate, it seems to get even brighter. When we see distant headlights headed our way, we duck into the pines and turn our heads until the vehicle passes to keep from losing our night vision. We wander out on the causeway to where the dirt road loops around a shoreside impoundment and the trees thin out. We stop and listen.

The din is wonderful, like boisterous conversations conducted in grunts, whistles, quacks and squeals. We can hear hen mallards and black ducks all around, and I insist I can distinguish hen gadwalls out there as well. Doug contests my identification, and I reply with one of the many traditional names hunting buddies reserve for each other. Mike snickers at both of us. Geese are yapping at the far end of the impoundment, and we are surrounded by the distant, tremulous wailing of swans. We stand there listening, occasionally shooting wisecracks at one another and yakking back at the hen mallards with our duck calls. We're having a big old time. I glance at Doug and then Mike, and they both have big, idiotic grins on their faces, and I suddenly realize that I do too. But Mike has the biggest grin. Mike never duck hunted before he fell in with Doug and me, and now he loves it. He's not your stereotypical duck hunter. In fact he's quite the opposite. He grew up in a small coal-mining town in central Pennsylvania, far from any marshes. Mike is somewhat dumpy, balding and forced by extreme nearsightedness to wear thick, heavy glasses. He's also severely afflicted with arthritis, which slows his gait and gnarls his fingers. Perhaps the greatest obstacle to his development as a duck hunter, however, is his deep, long-cultivated and abiding fear of water in quantities greater than those found in bathtubs. But his love of decoying birds is so great that he will swallow the lump in his throat and wade out into dark and forbidding, flooded cypresses to sit in a wooden box. Birds have strange effects on some people.

We stand there taking it all in when suddenly, directly overhead, we hear a sound like ripping canvas. All three of us instinctively look up, and there, hanging like huge, silver kites, are five swans. Their wings are locked and bowed, their flight feathers rattling, and they are sailing into the little patch of open water in front of us. How can it take birds that big so long to touch down? It seems like minutes pass before they ski into the smooth, black water, the little "rooster-tails" from their feet glistening like Christmas tree tinsel. It is so bright we can see their eyes and count their pinions. I'm sure they can see us, but apparently we are no threat (most of the ducks that pass our blind tomorrow will draw the same conclusion). We stop horsing around and start paying more attention.

Swans stream into the flock on the water, in twos and threes and family groups of four or five. Most pass within 20 or 30 yards, and they ignore us. The ripping buzz from their big primaries is almost constant. Now an occasional bunch of Canada geese sails in to the gathering swans; we can see their white cheek patches and even see their bills open when they call. Everything is brilliantly lit in shades of silver, black and gray.

TUNDRA SWANS ARE MAGNIFICENT CREATURES. They glide slowly on the surface of the water, and every motion is deliberate; they never seem to panic or hurry, and they always have an air of calm about them. Several years ago, another group of friends and I came down here three or four times to help with waterfowl banding. We used a cannon net, and then we'd restrain individual birds while they were weighed and banded. We would grab the swans and geese from the back, pinning their wings to their bodies with our arms and controlling their legs with one or both hands; we grasped

the ducks over their backs, at their shoulders. When you hold a captured duck, it never stops struggling to escape, until you tuck its head under a wing or cover its eyes with your hand. When you hold a Canada goose, it never stops fighting, and it will pull your cheek off with its bill if you give it half a chance. When you hold a swan, it doesn't struggle or fight; it rests calmly in your arms and watches your eyes. It doesn't have the panicked escape instincts of the smaller birds perhaps because it is so big and powerful that the concept of being prey is completely foreign. Swans never seem to lose their cool.

The swan music is almost overwhelming now, and still they come. Now there are maybe 100, 150 swans in front of us. We've been standing here for close to 45 minutes; my feet are almost numb, and I suspect Doug and Mike's are, too. But the big silver birds captivate us. Then, quite suddenly, the wind-chime gabble of the swans increases to an even higher level, and every incredibly long neck on the water stretches to its utmost. The birds start knotting up on the water, and, almost as one, they turn into an almost imperceptible breeze. All are running on the water, a ton of swan, lifting heavily but gracefully into the air, turning back over our heads and sailing over the causeway to ski into the impoundment on the other side. They flee deliberately, with the kind of ponderous grace of running elephants.

We ignore the fact that we really should get some sleep, and walk across the causeway to watch them a bit longer. The frost is already heavy on the dried Bermuda grass lining the road, and it twinkles everywhere in the moonlight. We enter the moon-shadows of the big loblollies as we walk out on the west impoundment road. There they are, about 100 yards out, beyond the edge of the tree shadows, pewter in moon-glow. They feed, call, preen and sleep. In spite of the moonlight, the Milky Way trails across the sky, and every once in a while, a meteor streaks overhead. Who can sleep with this kind of show? Orion's Belt will rise high before we finally turn in.

Tomorrow, we will arise insanely early, swaddle ourselves in camouflage and waddle through those dark cypresses to that wooden box. We will spend most of the morning once again watching swans, as they decoy the ducks we hope for away from our spread. We will get a little shooting, and then we will spend most of the afternoon napping. Tomorrow night, we'll go back out on the causeway and the swan music will ring again. It won't be nearly as cold, and the clouds warming the air will keep us from watching the big birds sail silvered through the stars, but that won't really matter. They will be there, and so will we.

And next year, Doug and I will be back, but Mike will miss it, stolen forever from our ranks by a drunken driver. We'll stroll out on the causeway, eavesdrop on the gossip from the Arctic and celebrate the life of our lost friend.

Although 15 years have passed, Mattamuskeet's causeway is still very dark at night. The stars still dazzle before the moon rises, frost still twinkles at the side of the road on a cold night and the swans still gather. I think I shall have to go there again this winter. ⊠

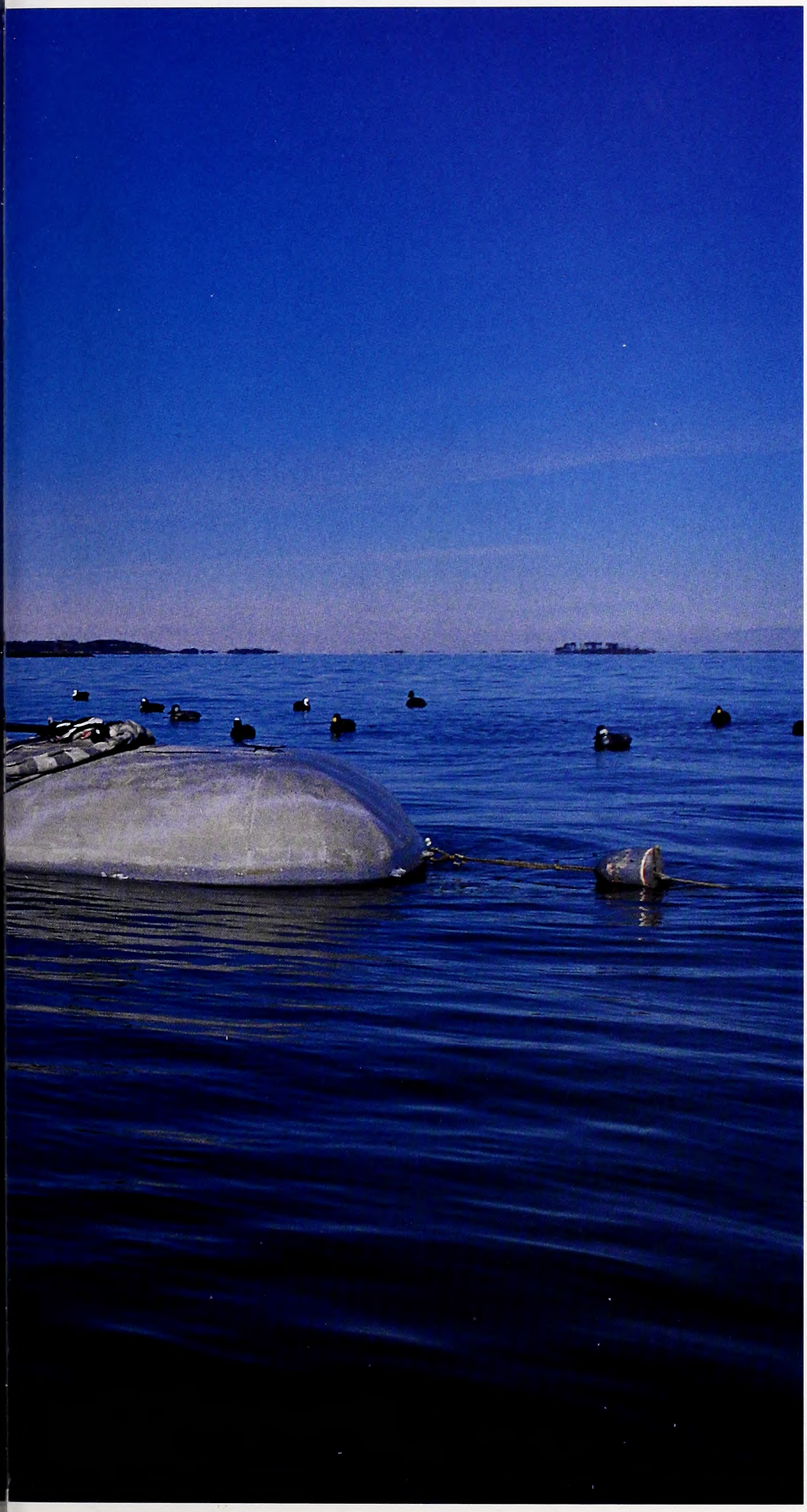
* * *

Clyde Sorenson is an entomology professor at North Carolina State University.

The Lowdown on Layouts

Wary canvasbacks and scaup learn to avoid stationary blinds. That's why the low-profiled layout boat offers an advantage for hunting deep-water diving ducks.

written and photographed by F. Eugene Hester ©2000



It was two hours before sunrise when we arrived at the ramp and launched our big johnboat. At this time at the edge of the bay, everything seemed so dark. After parking our vehicle, we left the dock and motored the boat down the river and into the bay. A few channel markers provided essential landmarks in the darkness as we made our way to where we had previously seen groups of ducks.

In addition to life jackets, flashlights, shotguns and several dozen decoys, we had an unusual object on board. It was a layout boat. Though such boats have been used for more than a century, it was the first one I had ever seen. This wide, flat boat—looking like a large fat pancake—was painted gray to blend with the water. In the middle was a cockpit just large enough for two hunters to lie side by side.

This boat had been carefully made by my nephew, William Hester, who was my host and hunting companion for this trip. He had

***Though hunting on** your back from a layout boat may not be the most comfortable endeavor, it can certainly pay off when it comes to drawing wary diving ducks into a decoy spread for close shooting.*

made it from a plan, but modified it to make it deeper and more seaworthy. Over the frame, he had placed plywood and fiberglass.

As we approached our destination, we could see the flashlights of other hunters setting up in shore blinds. One boat anchored offshore had attached vegetation to make it a small, floating brush blind. But our arrangement would be different. A layout boat is designed to float low in the water and be almost invisible to ducks flying just a few feet above the waves. It is made to blend with the water, not mimic marsh grass. The low profile and dull-gray finish combine to make the boat as near invisible as possible.

We reached our destination in the bay near the mouth of the river and began placing our diving duck decoys. We placed scaup decoys in one group and bufflehead decoys in another group a few yards away. Then we added all of our other diving duck decoys. "We want out as many decoys as we can get within 30 or 35 yards of where the layout boat will be, but we will leave this open place in the middle to encourage ducks to land there," William said.

After arranging the decoys, we motored about 300 yards away and anchored the johnboat. With precision that reflected considerable experience, William raised the layout boat and pushed it overboard. We got in and paddled it to the decoys and anchored it in the upwind edge of the decoys near the open spot.

"Fifteen minutes to go before shooting time," William said. The eastern sky across the broad bay was just beginning to turn a faint pink. "These ducks seem to spend the night in the middle of the bay, or maybe even out at sea," he said. "Before sunrise some of them will start moving in closer to shore to feed."

William explained that most of the buffleheads would come as singles or very small flocks, and they would be flying about three feet over the water. Scaup, goldeneyes or canvasbacks might come as larger flocks and might come in a little higher. He cautioned me to remain still until time to shoot.

Little plywood boards inclined behind our shoulders and heads enabled us to rest our heads just high enough to see over the cockpit sides.

Just before shooting time, two buffleheads buzzed over the decoys and continued up the river. With only a few minutes before the appointed time, a drake flew in and lit in the decoys, then flushed out.

The legal shooting time of 30 minutes before sunrise finally arrived, and we watched the open water for incoming ducks. Soon they began arriving, mostly as singles, but sometimes as small flocks. Each time we knocked one down we disconnected our bowline from our anchored buoy and paddled around the decoys to retrieve the duck.

These beautiful black-and-white bufflehead look like miniature goldeneye ducks. They weigh only about a pound, and are fast fliers. Their fast wing beats make them appear to be flying even faster than they are.

The ducks kept coming at irregular intervals and by mid-morning we had our limit. William held up a handsome drake and looked at the purple gloss of the bird's head. As he held the bird, he commented about migrations of buffleheads to and from the far north.

Buffleheads nest in Canada and Alaska. They nest in hollow trees and often use old flicker holes. They migrate in fall, and most of those coming to North Carolina arrive in late November or December. They prefer large areas of coastal rivers and sounds, where they feed mostly on animal food, including isopods, amphipods, shrimp and mollusks. Sometimes they eat fish and aquatic vegetation, including pondweeds and widgeon grass.

On this day we were expecting buffleheads and had gone to a spot they frequently used. We were using No. 4 steel shot, though William often uses larger No. 2 shot for larger ducks.

As we began to retrieve the decoys, William told of other hunts. One of the most exciting ones was a couple of years earlier, just after he had finished building the boat. On that hunt, he and a companion each got their limit that included bufflehead, greater scaup and goldeneyes. "Right then I knew I was on to something great, because we had hunted from a nearby shore blind a dozen times and only killed a limit one time. In our shore blind, even in good hunting weather and with a lot of ducks flying, it was difficult to get them to come close enough. But in that layout boat we killed a gorgeous drake goldeneye, that we had never been able to do from shore, and about 10 minutes after we finished our limits, another magnificent drake decoyed perfectly and landed within 25 yards of us."

On another hunt William and his companion each had killed their limit of drake buffleheads by 8:30 a.m. They had decided the night before to shoot only drakes, so they passed up a lot of hens and immature birds.

***William Hester shows** off two bufflehead he took from his layout boat. Other divers, including scaup (top) and canvasback (right), are prime targets when it comes to hunting big water from a layout boat.*

After these experiences, William concluded that with reasonable weather his layout boat would work great. The main advantage of a layout boat is that it can be used away from shore, even in the middle of the bay if the weather does not get too rough. After ducks get some experience with hunters, they become suspicious of stationary blinds and tend to stay far from shore. That is where a layout boat is at its best. Most ducks coming in intend to land in the decoys. This means that you get close-in shots and are not forced to take those marginal shots, at least in reasonable hunting weather. Most shots are within 30 or 35 yards, and at birds when they are landing.

"I've killed scaup, goldeneyes, surf scoters and buffleheads from this boat," William said. "And I expect to get a canvasback and maybe an old squaw on some of these hunts. I've seen a lot of other species, including Canada geese, swans, mallards, widgeons and gadwalls, but they mostly come over high and can see my boat better from up there. Also, when I am hunting divers, I don't have out the right decoys for these birds."

A layout boat works great for hunting any diving ducks. To hunt canvasbacks, redheads, scaup, scoters or others, you just need to find areas in which they are feeding, and set up there. A great advantage of these open-water areas is that they are public waters. As long as you are not too close to other blinds, you have countless square miles of hunting territory. (Certain counties, including Currituck and Dare, require a permit to hunt from a boat, considered a floating blind. Check the current *Regulations Digest* for local laws pertaining to floating blinds.)

Another great advantage of the layout boat is that you can go where the ducks congregate. This requires more scouting, but it pays off. You have a lot more places to hunt and are often exploring new areas.

"Being just above water in the layout boat at the same level as the ducks is a neat experience," William said. "Of course, the down side is that it is relatively uncomfortable compared to more standard floating blinds or shore blinds, and you can hunt a maximum of only two people."

Some hunters think the mallard is the only duck worth hunting, and may even sport a bumper sticker that says, "If it doesn't have a green head it is not a duck." But for hunters like William, any duck is a worthy quarry.

"Some hunters don't want to hunt buffleheads," he said. "That just makes them more available to me; therefore, I get a lot more wing shooting by pursuing these sporty birds."

Be flexible about hunting methods and species, and make the most of North Carolina's diverse open-water hunting areas.

"By hunting in a variety of ways and places, I get more birds in the bag and more species too," William said. "I enjoy variety. All else being equal, the more species I kill in a season, the happier I am." ⊠

Building a Layout Boat

Building a layout boat is no simple task. However, if you're up to the challenge, plans to build one are available from various commercial sources including those listed below. Some manufacturers also offer kits and finished boats.

Boats By Busick
174 Edgewood Dr.
Amherst, Ohio 44001
(440) 988-7160

Devlin Designing Boatbuilders
3403 Steamboat Island Road NW Suite-532
Olympia, Wash. 98502
(360) 866-0164
www.devlinboat.com

Lock, Stock, and Barrell
P.O. Box 267
St. Claire Shores, Mich. 48080
(810) 790-2678
www.lockstockbarrell.com

Mystic Seaport
P.O. Box 6000
75 Greenmanville Ave.
Mystic, Conn. 06355
(860) 572-0711
www.mysticseaport.org

For mammals in the weasel family, life can be a matter of

Stink or Swim

North Carolina's most diverse group of predators boasts skunks capable of sophisticated chemical warfare, otters that maneuver in rapid waters, minks that use modest stink bombs and swim to catch food, and weasels the size of mice.

written by Roger A. Powell ©2000 / *illustrated by Consie Powell* ©2000

A Diversity of Weasels

The weasel family, or Mustelidae, is more diverse than any other family of mammalian predators, both worldwide and right here in North Carolina. The Canidae, or dog family, has four representatives in North Carolina: red wolves, coyotes, red foxes and gray foxes. The Ursidae has only black bears, the Procyonidae has only raccoons, and the Felidae has only bobcats. The Mustelidae, in contrast, has six species in North Carolina: least weasels, long-tailed weasels, minks, otters, striped skunks and spotted skunks.

Mustelids live a diversity of lifestyles. The small weasels are specialized predators superbly adapted for catching mice. Otters and minks **forage** and live along waterways, though minks are also excellent mousers. Skunks eat a diversity of foods, including insects, fruits, small mammals, birds and **carrion**.

Smelly Messages

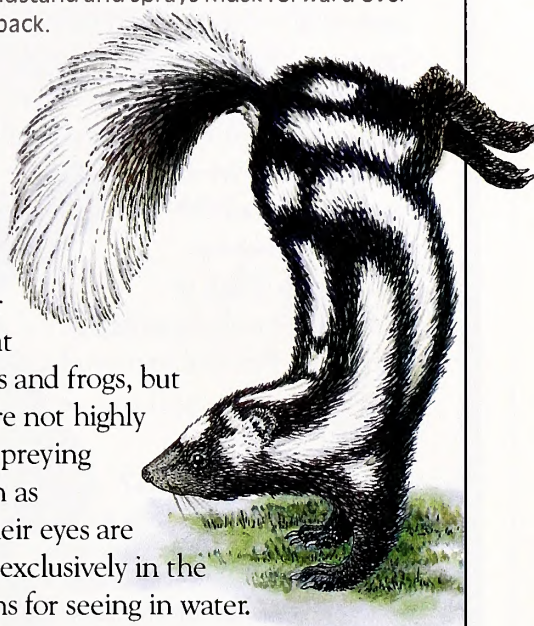
All members of the weasel family have various **scent glands**. Most of the scent glands are used to communicate something about **dominance** or **territory** ownership to other members of a mustelid's own species. Their **anal glands**, however, have been developed to send multiple messages, including strong warnings to potential predators. These paired glands are located on either side of the anus. In most mammals that have them, including mustelids, anal glands put a chemical sheath around feces, telling other animals not only who left the odor, but also his or her sex and reproductive condition. Most mustelids also rub their anal glands directly onto objects in their environment, leaving the same messages but without needing feces as a billboard.

A mink is a land hunter that is also a good swimmer. Its small size helps it hunt many different prey in different places and its waterproof coat repels water when it pursues aquatic prey.

CHEMICAL WARFARE

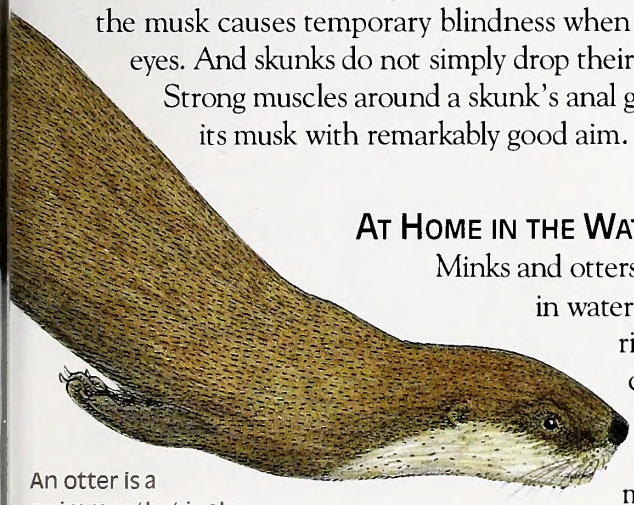
Mustelids put their anal glands to even greater use. The **musk** in mustelids' anal glands has a very strong, very foul odor. When scared or attacked, weasels and minks discharge a large amount of musk from their anal glands. The odor can give a predator pause. Skunks have taken their chemical defense to a glorious extreme. Not only do the glands produce musk with an odor so strong and so foul that it causes people to vomit, the musk causes temporary blindness when it gets in an animal's eyes. And skunks do not simply drop their musk; they project it. Strong muscles around a skunk's anal glands enable it to squirt its musk with remarkably good aim.

Striped skunks (far left) and spotted skunks (below) give several warnings before they resort to chemical warfare. First, a skunk stomps its front feet. Then it chatters its teeth or hisses. If those warnings are ignored, the skunk uses its final weapon. A striped skunk arches its back, raises its tail and sprays. A spotted skunk does a handstand and sprays musk forward over its back.



AT HOME IN THE WATER

Minks and otters do most or all of their foraging in water and are nearly always found near rivers, streams and lakes. Otters eat crayfish, freshwater mussels, crabs and frogs, but depend mainly on fish. They are not highly selective of the fish they catch, preying mostly on slow, abundant fish such as suckers, catfish and carp. Because their eyes are well adapted for seeing underwater, otters forage almost exclusively in the water. On land, their vision is limited by their adaptations for seeing in water.

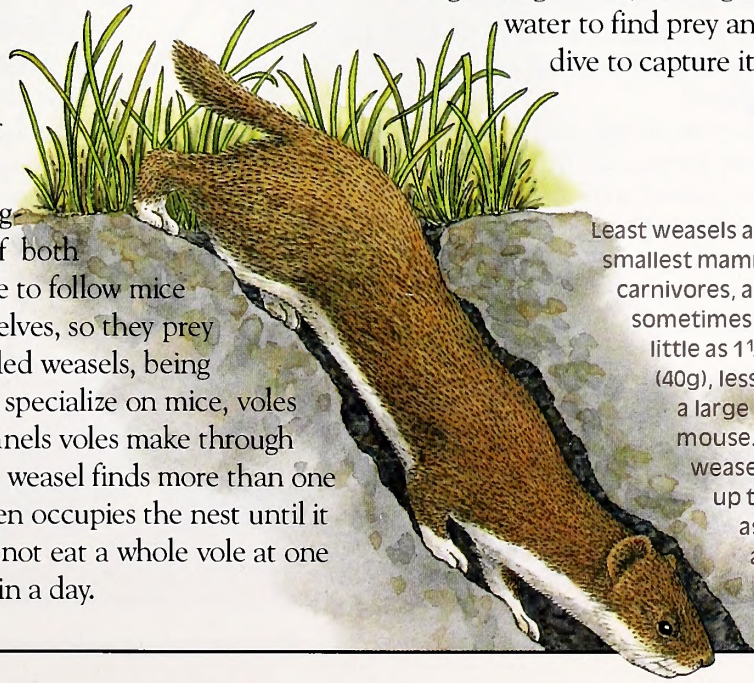


An otter is a swimmer that is also agile on land. Adaptations for swimming include closeable nostrils and ears, stiff whiskers that detect movements in water currents, paws webbed to the ends of the digits, and a long tapered tail that acts as a powerful rudder.

The much smaller minks prey less heavily on large fish, concentrating on crayfish, frogs, minnows and small fish. They also prey on **terrestrial** critters, especially small rodents. In contrast to otters, minks have eyes adapted to seeing out of the water, and under water, they are quite nearsighted. When hunting aquatic critters, they generally forage along shores, looking into the water to find prey and then dive to capture it.

A PERFECT MOUSE-HUNTER

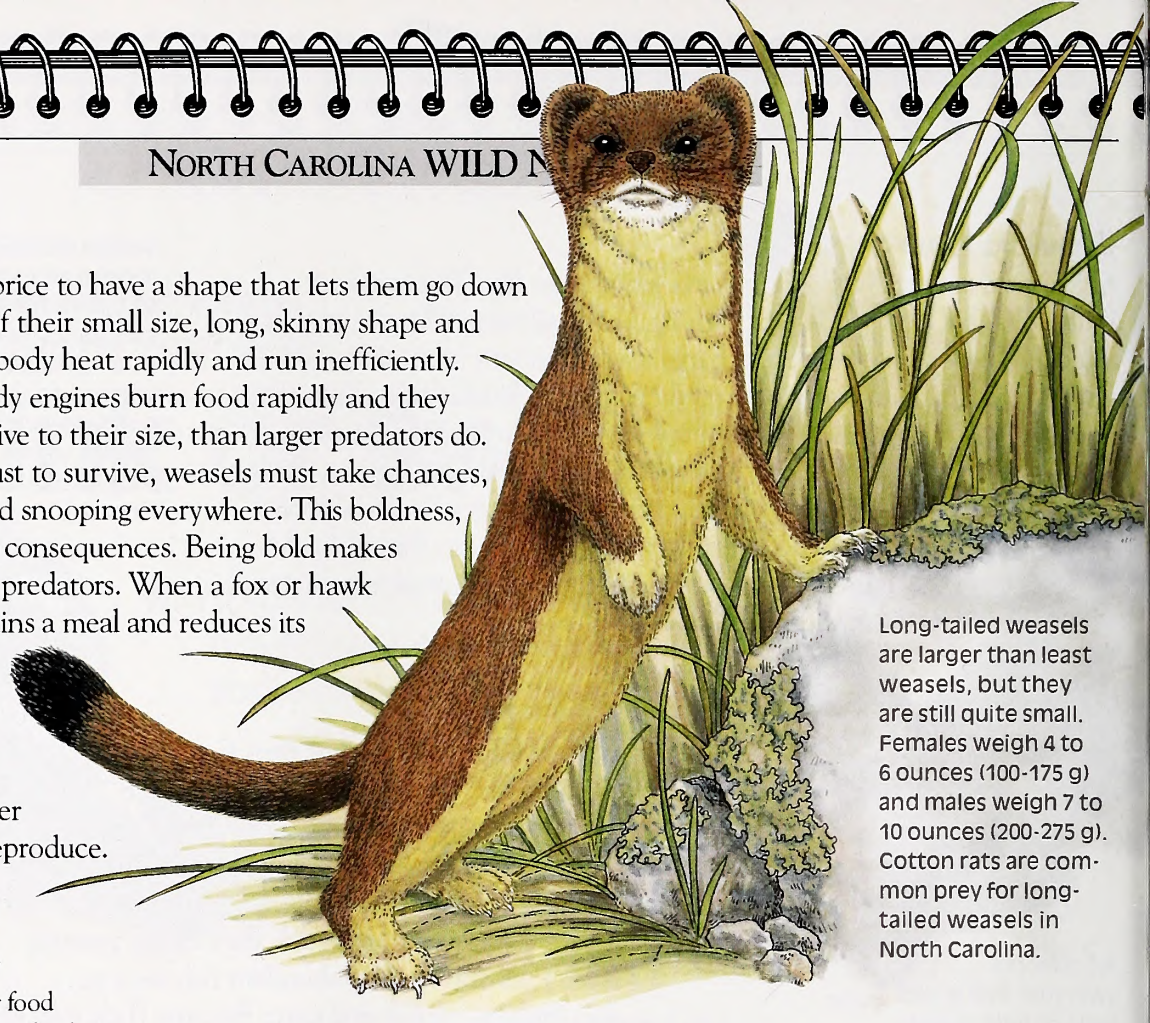
Weasels are among the most **carnivorous** of all mammals, eating fewer fruits and nuts than any other carnivores, except perhaps cats. Long-tailed and least weasels hunt mice. Members of both species are long and skinny—the perfect shape to follow mice down their holes. Least weasels are tiny themselves, so they prey almost exclusively on mice and voles. Long-tailed weasels, being larger, eat larger and more diverse prey yet still specialize on mice, voles and rats. Weasels search for voles down the tunnels voles make through thick grass and down into the ground. When a weasel finds more than one vole in a nest, it kills all that it can capture, then occupies the nest until it has eaten all of its **cache**. A weasel usually cannot eat a whole vole at one time, but must eat the vole over several meals in a day.



Least weasels are the smallest mammalian carnivores, and females sometimes weigh as little as 1½ ounces (40g), less than a large meadow mouse. Male least weasels weigh up to twice as much as females.

LIFE ON THE EDGE

Weasels pay a steep price to have a shape that lets them go down mouse holes. Because of their small size, long, skinny shape and short legs, weasels lose body heat rapidly and run inefficiently. Consequently, their body engines burn food rapidly and they must eat far more, relative to their size, than larger predators do. To catch enough prey just to survive, weasels must take chances, searching constantly and snooping everywhere. This boldness, however, has dangerous consequences. Being bold makes weasels visible to larger predators. When a fox or hawk kills a weasel, it both gains a meal and reduces its **competition**. Most weasels live only a few months before starving to death or becoming meals for other predators. Few live to reproduce.



Long-tailed weasels are larger than least weasels, but they are still quite small. Females weigh 4 to 6 ounces (100-175 g) and males weigh 7 to 10 ounces (200-275 g). Cotton rats are common prey for long-tailed weasels in North Carolina.

What Does It Mean?

forage: to search, usually for food
carrion: dead animals eaten as food
scent glands: organs on an animal's skin that produce chemicals whose odors are used to communicate with other animals
dominance: having a commanding influence over other animals
territory: a particular place or area used by only one animal of a species, and from which other members of the species are excluded
anal glands: a pair of organs located on either side of an animal's anus that produce chemicals used to communicate with other animals. Anal glands are one type of scent gland.
musk: a strong smelling substance produced by a gland, especially an anal gland
terrestrial: living on land, as opposed to living in the water
carnivorous: having a diet that consists mostly of other animals that are captured and killed
cache: (verb) to hide something for later use, or (noun) the items that are hidden
competition: the simultaneous need by two animals (or plants) for the same food or other resource that is in limited supply

Read and Find Out

- *A Field Guide to Animal Tracks* by Olaus J. Murie, Houghton Mifflin Company, 1954.
- *Furbearing Animals of North America* by Leonard Lee Rue III, Crown Publishers Inc., 1981.
- *Mammals of the Carolinas, Virginia, and Maryland* by Walter C. Biggs, Jr., University of North Carolina Press, 1985.
- "You Can Call Him 'Cute' Or You Can Call Him 'Hungry,'" by Richard Conniff, *Smithsonian*, vol. 27, No.11 (February 1999).

In *Wildlife in North Carolina*:

- "The River Acrobat" by Lawrence S. Earley, July 1983.
- "That Lean and Hungry Look" by Jay Davies, May 1986.
- "Welcome Home, River Otter" by Mike Carraway, May 1991.
- "Nature's Stop Sign" by Lawrence S. Earley, October 1991.
- "Perils of Small Predators" by Lawrence S. Earley, July 1995.

Editing and design by Consie Powell. Art puzzle by Anne Marshall Runyon.

Relative sizes of otter, striped skunk, spotted skunk, mink, long-tailed weasel and least weasel

Get Outside

Be a mustelid detective: Most mustelids are quite secretive, but often leave a "calling card" in obvious sight. When you are hiking trails or snooping along waterways, watch for scat (droppings). Each species has a distinctive type of scat and you can identify who was there by what scat was left behind. You can also get an idea of what prey was eaten: does the scat contain fish scales or bits of orange exoskeleton? Can you see berry seeds or fur or bits of bone? If you keep a few plastic bags in your pocket, you can make note of where you found them, then take scats home with you and identify them later. Most field guides to tracks also have drawings of scats.

It's WILD!

Project WILD Activities for teachers and students that correlate to this topic include:

Quick Frozen Critters: teaches students about predator-prey relationships.

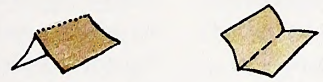
Who Fits Here?: teaches students to understand how each ecosystem has characteristic life forms adapted to live there.

First Impressions: teaches students to distinguish between reactions about animals and their behaviors based on stereotype compared to those based on accurate information.

Blue Ribbon Niche: teaches students about a variety of factors involving riparian habitats.

The Least Weasel...*Mustela nivalis*

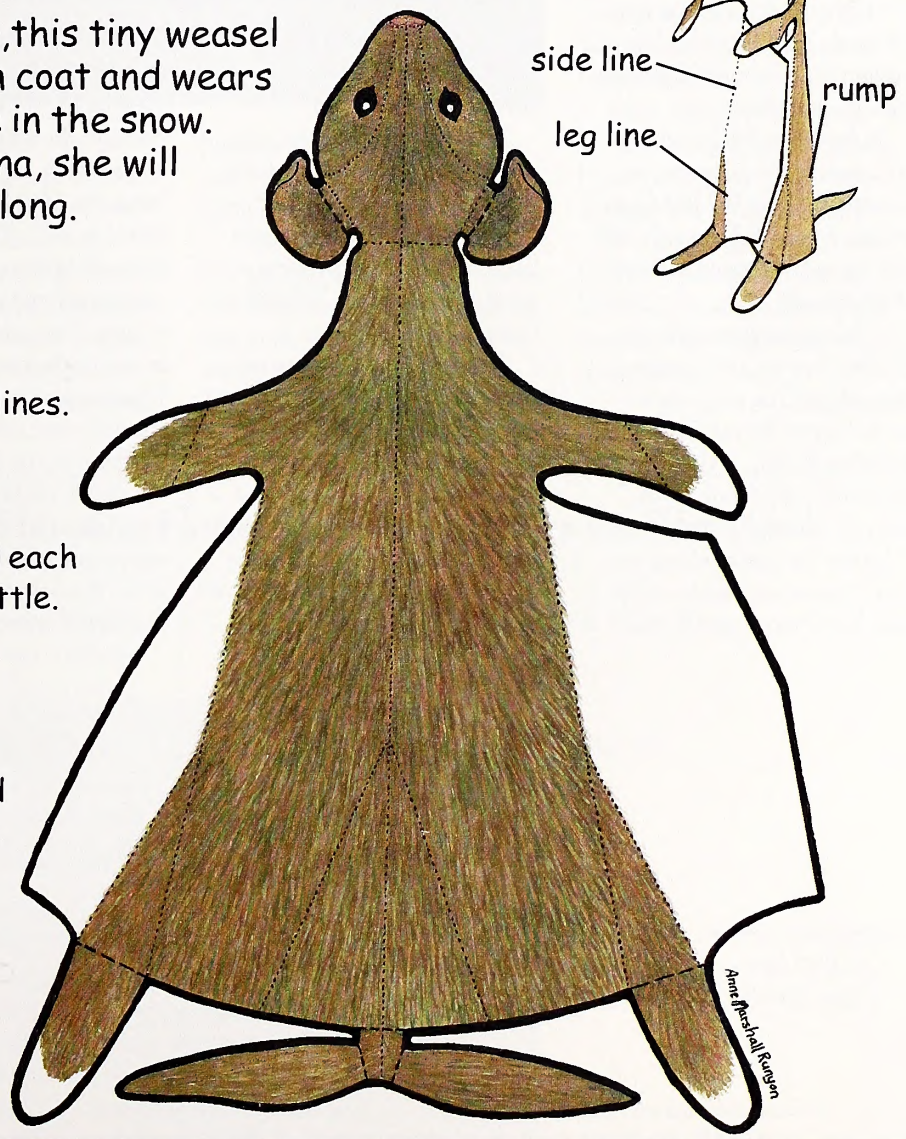
By December in the far north, this tiny weasel has molted her summer brown coat and wears snowy white fur. She can hide in the snow. Here, in warmer North Carolina, she will wear her brown color all year long.



····· fold down ---- fold up

1. Cut out your weasel on the solid lines.
2. Fold her lengthwise and reopen.
3. Fold each ear down and then up.
4. Fold head down, and gently bend each cheek down. Bend nose down a little.
5. Fold tail up, then fold two sides together and glue.
6. Gently bend down lines at rump.
7. Fold side lines down, gently bend down leg lines. Glue tummy shut.
8. Fold hind feet forward, and front paws down.

(Your weasel is the actual size of a female least weasel. For a male, copy the pattern at 130 percent, then assemble.)



Wildlife Commission Dedicates New Fishing Access Area

A new fishing access area at Newbold pond in Edgecombe County was recently dedicated to the late father of a former chairman of the N.C. Wildlife Resources Commission.

The public fishing area, which features a handicapped-accessible parking lot and a handicapped-accessible fishing pier, will be named the Robert E. Barnhill Sr. Public Fishing Access Area. Land and money for the public fishing area were donated to the Wildlife Commission from Barnhill Contracting Co., in Tarboro.

Robert Barnhill Jr., who is president of the company, was a member of the Wildlife Commission from 1987 through 1991 and served as chairman from 1989 through 1991.

"Our agreement with the Wildlife Resources Commission calls for the property to be developed for public use, including fishing, with access for handicapped individuals," Barnhill said, at the dedication. "Making this public fishing area handicapped accessible would have been very important to my father, because he was handicapped at an early age after contracting polio."

ROGER JONES

***A new public fishing** access area was recently dedicated at Newbold Pond, in Edgecombe County. From left are: Wildlife Commission Director Charles Fullwood, Robert Barnhill Jr., Mrs. Robert E. Barnhill Sr. and Wildlife Commission Chairman John Pechmann.*

The public fishing area consists of three tracts—Newbold, Etheridge and Union Camp—totaling more than 210 acres. Each tract features a fishing pond stocked by the Wildlife Commission.

Harvestable-sized channel catfish have been stocked twice in the 30-acre Newbold Pond and triploid grass carp have been stocked into the 28-acre Etheridge Pond and the 55-acre Union Camp Pond, with plans to stock channel catfish in all three ponds in the future. The Commission has invested more than $75,000 and an 11-man crew has dedicated more than one month of time to the project, which is expected to cost more than $100,000 when completed in 2002. The handicapped-accessible pier on Newbold Pond was completed earlier in September. The public has 24-hour access to the pier and the Commission plans to install lights in the adjoining parking lot.

Speaking on behalf of the Wildlife Commission, Chairman John Pechmann expressed appreciation to Robert Barnhill Jr. for the donation as well as a number of other charitable acts.

"He and his company were there for eastern North Carolina in the aftermath of Hurricane Floyd. And now, when the state's budget is tight, and adding additional hunting and fishing opportunities for our sportsman is difficult, Barnhill is there again," Pechmann said. "He has helped us make a great addition to our community fishing program, and this will be particularly beneficial to our youth and to our physically challenged."

The Newbold Pond portion of the Robert E. Barnhill Sr. Public Fishing Access Area is located on Shiloh Road at exit 488 off U.S. 64 in Edgecombe County. For more information about this public fishing access area, call (919) 733-3633, ext. 281.

—Russell Wong

Edited by Chris Powell

On Patrol

***Editor's note:** The situation described below exemplifies the always unpredictable nature of a N.C. Wildlife Resources Commission enforcement officer's duty.*

Master Officer John Reams was patrolling bank fishing on Lake Gaston when he observed a vessel operating in a reckless manner. The wildlife officer noted the direction the vessel was traveling and drove his patrol vehicle to the area. Spotting a nearby bass boat, Officer Reams commandeered the craft, saying to its owner the equivalent of, "Follow that car." Officer Reams and his "deputies" gave chase and quickly apprehended the man after he beached his boat and tried to run. The man was charged with operating a boat while intoxicated. When it was all over, the owner of the commandeered bass boat said, "This is better than television!"

2001 North Carolina Duck Stamp to Be Unveiled

The much-anticipated unveiling of the 2001 N.C. Duck Stamp will take place at the 6th Annual East Carolina Wildlife Arts Festival and North Carolina Decoy Carving Championship to be held Feb. 2-4 at the Civic Center in Washington, N.C.

The show will be open to the public from 9 a.m. to 5 p.m. on Feb. 3 and from 9 a.m. to 4 p.m. on Feb. 4.

The original art for the stamp will remain on display for the public to enjoy throughout the weekend. Highlights of the weekend will be the presence of a set of exhibitors featuring carvers, artists, retriever demonstrations and children's decoy. There will also be a painting contest, children's wildlife poster exposition and a live wildlife art and decoy auction at 7 p.m. on Saturday evening at Cliff's Convention Center in Chocowinity.

***The 2001 duck** stamp painting will be unveiled at the 6th Annual East Carolina Wildlife Arts Festival, to be held in Washington, N.C. "Canvasbacks at the Whalehead Club" (left) was the winning painting for the 2000 N.C. Duck Stamp.*

The N.C. Wildlife Resources Commission's duck stamp and print program was initiated in 1983 to raise funds for waterfowl conservation in this state, including acquiring and improving habitat. Purchase of stamps was voluntary until 1988. Since then, North Carolina waterfowl hunters have been required to buy a state stamp in addition to the federal duck stamp.

Money from the sale of state stamps and prints goes into the Wildlife Commission's waterfowl fund, which has raised more than $3 million since it began. The fund has helped in the purchase and improvement of thousands of acres of valuable wetlands, including Conine Island in Bertie County, Hunting Creek Swamp in Davie County and White Oak Impoundment in Onslow County.

State waterfowl stamps go on sale each July for $10 apiece. Prints can be purchased from independent art dealers for $141.

For more information, call (252) 946-2897 or visit the Wildfowl Guild's Web address: ecwildfowlguild.homestead.com/Index.html.

—Chris Powell

2000-2001 Bag Limits, Shooting Hours and Season Dates for Waterfowl

Bag Limits

Conventional bag: Six ducks with no more than one black duck (black duck season is closed until Dec. 1), four mallards with no more than two hen mallards, two wood ducks, two redheads, three scaup, four scoters, one fulvous tree duck, one mottled duck, one canvasback or one pintail. The season on harlequin ducks is closed. (Possession limits are twice the daily bag unless otherwise noted.)

Other Limits: a) 15 snow & blue geese, no possession limit
b) two brant
c) five mergansers (one hooded merganser)
d) seven sea ducks (four scoters) In special sea duck areas only
e) 15 coots

Shooting Hours

One-half hour before sunrise to sunset.

Seasons

Ducks, Mergansers & Coots: Dec. 8-Jan. 20

Sea Ducks: Through Jan.20

Snow & Blue Geese: Through March 10

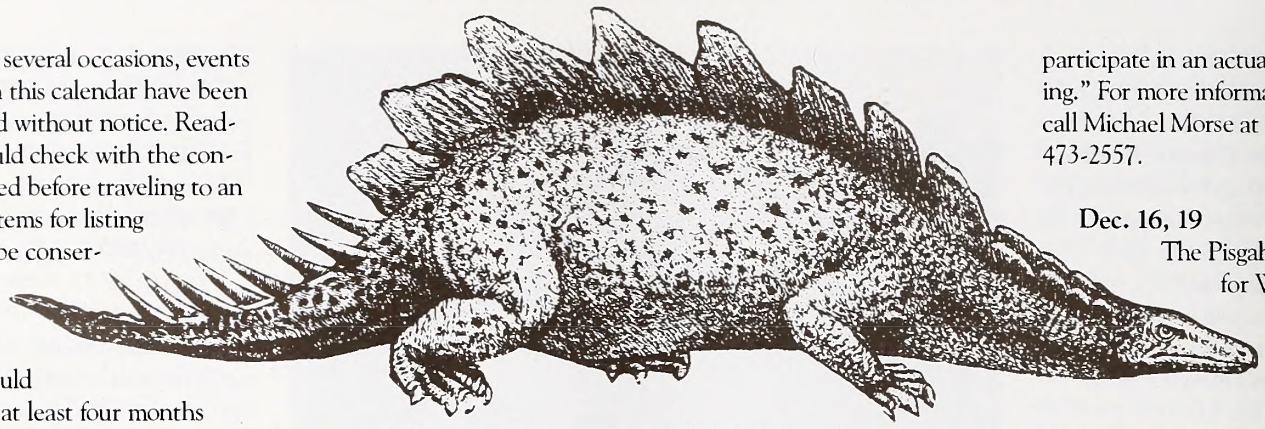
Brant: Dec. 8-Jan. 20

Swan: Through Jan. 31 (by permit only)

Youth Waterfowl Day: Jan. 27, 2001. Youths must be 15 years of age or younger and accompanied by an adult at least 21 years of age. Species include ducks, mergansers and coots. The adult may not hunt these species.

You may also call 1-800-675-0263 for this information.
Report all bands by calling 1-800-327-BAND.

North Carolina Outdoor Calendar of Events



On several occasions, events in this calendar have been changed without notice. Readers should check with the contact listed before traveling to an event. Items for listing should be conservation oriented and should be sent at least four months in advance.

Dec. 12

The Schiele Museum of Natural History, located in Gastonia, will conduct the Dinosaur Encounters program from 1 to 3:30 p.m. What did dinosaurs eat? What color were dinosaurs? Visit the Bobcat's Den to dig deeper into prehistoric life by examining casts and actual fossils of bones, teeth, skin or claws. Each 15- to 20-minute presentation of Dinosaur Encounters explores a different theme about dinosaur adaptation. For more information, call (704) 866-6900.

Dec. 15

The Alligator River National Wildlife Refuge will sponsor a Red Wolf Howling Safari at 6:30 p.m. at the Alligator River Refuge. The safari will begin at the Creef Cut Wildlife Trail, located 20 minutes from Manteo on U.S. 64 between East Lake and Manns Harbor in the Alligator River Refuge. Participants will learn about red wolves and can participate in an actual "howling." For more information, call Michael Morse at (252) 473-2557.

Dec. 16, 19

The Pisgah Center for Wildlife Education will conduct the Christmas Bird Count program from 2 to 4 p.m. Dec. 16 and 9 to 11 a.m. Dec. 19. Participants of all ages can begin a new holiday tradition by aiding scientists in studying the local population trends of bird species in early winter. Come dressed for the outdoors. For more information, call (828) 877-4423.

"Rivers of North Carolina" Articles Garner Top Awards

Wildlife In North Carolina *editors Rodney Foushee (left) and Chris Powell (center) recently took top honors in the Association for Conservation Information's national writing contest. Foushee took first place for "River Through Time" and second place for "Harnessing Rivers." Powell took first place for "Fight for the River of Peace." The articles ran in the magazine's November 1999 special issue, "The Rivers of North Carolina." They are accompanied by Editor Lawrence S. Earley.*

MELISSA McGAW

Did You Know?

Often regarded as a dangerous recreational activity, hunting actually is much safer than many other sports, such as golf.

According to statistics from the National Safety Council, hunting has fewer injuries per 100,000 people participating than football, baseball, cycling, volleyball, swimming, golf, tennis, fishing, bowling, badminton, billiards and ping pong. In comparison, hunting endures 7.06 injuries per 100,000 participants, while the next safest sport is ping pong, with 15.32. The most injuries occur in football, with 3,313.48 injuries per 100,000 participants.

—Courtesy of the Wildlife Management Institute

Field Notes

Eastern Gun Deer	Through Jan. 1
Black Bear	See *Regulations Digest*
Red & Gray Squirrel	Through Jan. 31
Fox Squirrel	Through Dec. 30
Fox	See *Regulations Digest*
Raccoon and Opossum	Through Feb. 28
Ruffed Grouse	Through Feb. 28
Crow	June 1 to Feb. 28 plus Christmas
Bobcat	Through Feb. 28

Information on bag limits, either-sex deer season and other regulations may be found in the *2000-2001 North Carolina Inland Fishing, Hunting & Trapping Regulations Digest*. For a copy, check with license agents or contact the N.C. Wildlife Resources Commission at (919) 662-4370.

KEN TAYLOR

The 2001 North Carolina Wildlife Calendar Is Here!

"Breaking Cover" by Robert C. Flowers Jr. is one of 12 fine paintings featured in the 2001 North Carolina Wildlife Calendar. *Order now before it's sold out.*

The works of Robert B. Dance, Robert C. Flowers Jr., Duane Raver, Dempsey Essick, Tim Larson, Cotton Ketchie, Keith Hendrickson, Curwood Harrison, James A. Brooks, Mel Steele, Robert Herr and Amy Gardner Dean are featured in the *2001 North Carolina Wildlife Calendar*.

Order yours today! Payment must accompany your order. Calendar orders may be charged to VISA or MasterCard, or enclose your check or money order (payable to NCWRC). Complete the form below and mail with payment to:

2001 Calendar, N.C. Wildlife Resources Commission
1710 Mail Service Center, Raleigh, N.C. 27699-1710
(Office is located at 322 Chapanoke Road in Raleigh.)

A GREAT GIFT!

Please send me _____ calendars at $6.00 each .....$_____

All N.C. residents add $.36 sales tax per calendar ..... _____

☐ Enclosed is my check for **total** payment of .....$_____

☐ Charge to MasterCard or VISA for the calendar(s) ordered above. My card number is _____ and the expiration date is _____/_____.

_____ (____)_____
Card holder signature | Day Time Phone No.

If ordering 10 or more calendars, please provide your UPS deliverable address.

Name _____

Address _____

City/State/Zip_____

Phone (_____) _____

All orders must be prepaid. A $20 charge will be made on returned checks (N.C.G.S. 25-3-512). **For fund raising and bulk rate information (10 calendars or more), call 919-662-4377. Please allow 4 weeks for delivery.**

Wildlife In North Carolina 2000 Index

Article	Author/Photographer	Topic	Issue
Art/Photo Portfolio			
Duped!	F. Eugene Hester	Wood ducks	Jan.
Little Foxes	Ken Taylor	Foxes	April
The Shape of Spring	Melissa McGaw	Bird eggs	May
Battling Bucks	F. Eugene Hester	Deer	Nov.
Reflections of Winter	George Humphries	Winter scenes	Dec.
Commission Activities			
A Flood of Memories	Chris Powell	Enforcement during flood	March
Making Waves	Rodney Foushee	PWCs	May
Furry Enforcement Officers	Chris Powell	Canine program	Nov.
Conservation, Environment			
Conservationist at the Helm	Lawrence S. Earley	Bill Holman interview	Jan.
The Flood Next Time	Lawrence S. Earley	Floodplain development	March
A Cleaner Hog Industry?	Chris Powell	Hog farm technologies	March
Going Native	Rob Gardner	Native plants	April
New Museum Spreads Its Wings	Karen Kemp	Natural Science Museum	May
Gift of a Lifetime	Chris Powell	Endowment Fund	Oct.
Mercury Rising	Rodney Foushee	Mercury contamination	Nov.
Fisheries Management			
The Case of the Missing Shad	Pete Kornegay	Shad recovery	Feb.
Fishing, Freshwater			
No-Hassle Stripers	David Hart	Striped bass	Feb.
Crazy Fishing	Jim Dean	Unusual circumstances	March
Tiny Trophies of the Smokies	H. Lea Lawrence	Brook trout	April
That Unforgettable First Fish	F. Eugene Hester	Fishing with youths	May
Farm Pond Basics	David Hart	Farm pond fishing	June
Jump into Fly-Fishing	Keith Berend	Float-tube fishing	June
Jack and His Sliding Cork	Jim Dean	Panfish	June
Mr. In-Between	Soc Clay	Spotted bass	July
Little Alligator Summers	Jim Dean	Little Alligator River	Aug.
Fishing, Saltwater			
Small Boat, Big Water	Chris Powell	Offshore fishing	July
King of the Bottom Fish	Joel Arrington	Flounder	Aug.
Bridge Stripers	Joel Arrington	Stripers	Oct.
Hunting, Big-Game			
The Ultimate Big-Game Challenge	Mike Gaddis	Turkey hunting	April
Hunting Seasons Roundup, 2000-2001	Staff	Hunting seasons	Sept.
High-Country Hunting	H. Lea Lawrence	Deer hunting	Nov.
Hunting, Small Game and Waterfowl			
Walking-Up Woodcock	Gerald A. Almy	Woodcock hunting	Jan.
To the Point!	Mike Gaddis	Pointing dog trials	Feb.
Friends, Feathers and Fun	Chris Powell	Dove hunting	Aug.
Hot Hunting for Early Birds	Mike Marsh	Teal season	Sept.
October Means Wood Ducks	David Hart	Wood ducks	Oct.
The Last Hunt	John W. Duggins Sr.	Quail hunting	Dec.
Swan Music	Clyde Sorenson	Duck hunting	Dec.
The Lowdown on Layouts	F. Eugene Hester	Layout boats	Dec.
Natural History and Wildlife			
A Brief Glance Backwards	T. Edward Nickens	Wildlife timeline	Jan.
Birds That Nest in Cavities	David S. Lee	Cavity nesters	Jan.
The Sounds of Spring	Harry Ellis	Frogs	March
Hawk of the Bottomlands	David S. Lee	Red-shouldered hawk	June
In Search of Smoky Mountains Fungi	Phillip Manning	Mushrooms	July
Exploring the Spider's World	Harry Ellis	Spiders	Aug.
Hawks on a Fall Wind	David S. Lee	Hawk watching	Sept.
Nature's Ways			
Spider Weight	Roger Powell	Falling wildlife	Jan.
A Wing and a Prayer	Jeff Beane	Praying mantis	Feb.
Why Birds Can Fly	David S. Lee	Mechanics of flight	March
Sensing the Waters	Terry Krauthurst	Fish olfactory senses	April
River Pancakes	Jeff Beane	Spiny softshell turtle	May
The Bare Bones of Skeletons	Roger Powell	Skeletons	June
Deciphering Mimicry	Jeff Beane	Lookalike species	July
Two Worlds, One Fish	David S. Lee	Mummichog	Aug.
Galling Bugs	Phillip Manning	Tree deformities	Sept.
The Flipping Beetles	Jeff Beane	Click beetles	Oct.
Hornets at Rest	Clyde Sorenson	Bald-faced hornets	Nov.
Ice Water in Its Veins	Jeff Beane	Wood frogs	Dec.
N.C. WILD Notebook			
Come Back Bluebirds	Buffy Silverman	Bluebird conservation	Jan.
Longleaf Pine Forests	Jeff Beane	Longleaf pines	Feb.
Finding the Way Home	Buffy Silverman	How animals navigate	March
Sunfish	Jeff Beane	Types of sunfish	April
Magnificent Wild Turkeys	David T. Cobb	Wild turkeys	May
Mother Nature's Flypaper	Consie Powell	Carnivorous plants	June
Nature's Poet	Julie Dunlap	Rachel Carson	July
What's So Great About Whales?	Julie Dunlap	Whales	Aug.
Meet Bear Biologist Mark Jones	Rodney Foushee	Bear biologist	Sept.
What's in a Name?	Marianne D. Wallace	Latin names	Oct.
The Fungus Among Us	Terry Krautwurst	Mushrooms	Nov.
Stink or Swim	Roger A. Powell	Animal scents	Dec.
North Carolina History			
Haunted Island	Bland Simpson	Waterfowling heritage	Jan.
Along the Tennessee Border, 1799	John Hairr	N.C./Tenn. state line	May
Nikwasi—Sacred Fire	Burt Kornegay	Cherokee Indians	July
Living on Hope	Carmine Prioli	Harkers Island	Nov.
North Carolina's Rootheads	Andresen and James	Hand-carved decoys	Dec.
Outdoor Recreation			
My Mountain	T. Edward Nickens	Hanging Rock	Feb.
Feminine Wilds	Carol Marsh	Outdoor women	April
Clammers Delight	Rodney Foushee	Clamming	July
Touring the Cherohala Skyway	J. Dan Pittillo	Scenic locations	Aug.
Bubba's Autumn Outdoor Etiquette Guide	T. Edward Nickens	Sportsmanship	Sept.
Fall on the Water	John Manuel	Canoeing	Oct.
Our Natural Heritage			
Quest for Fire	Jim Dean	Fire	Jan.
The Incompleat Sportsman	Jim Dean	Forgetfulness	Feb.
Mill Pond Lunkers	Jim Dean	Bass fishing	March
The Angle of Disrespect	Jim Dean	Fishing	April
Romancing the Redear	Jim Dean	Shellcracker fishing	May
When Tradition Is a Trap	Jim Dean	Bass fishing	June
Shifting Sands	Jim Dean	Bogue Banks	July
A Mere Shell of Itself	Jim Dean	Shell collecting	Aug.
Hit Or Miss Doves	Jim Dean	Dove hunting	Sept.
Deer in the Headlights	Jim Dean	Deer poaching	Oct.
The Closing Window	Jim Dean	Quail populations	Nov.
Living Large and Long	Jim Dean	Old age	Dec.
Wildlife Management			
Hardluck Terrapin	Phil Spivey	Diamondback terrapins	Feb.
The Long Wait	Rodney Foushee	Flooding impact	March
Distant Partners	Mark E. Johns	Migratory songbirds	April
Building Bigger Bucks	Chris Powell	Deer	June
Disturbing News for Wildlife	Lawrence S. Earley	Early succession	Sept.
A Case for Management	Lawrence S. Earley	Early succession	Oct.
Wildlife Through The Year			
New Year Improvements	Rodney Foushee	Recycling	Jan.
February Improvements	Rodney Foushee	Planting lespedeza	Feb.
Tax Credits for Wildlife	Rodney Foushee	Conservation Tax Credit	March
Simple Solutions	Rodney Foushee	Placing bird feeders	April
Managing for Woodcock	Rodney Foushee	Woodcock	May
Pond Management 101	Rodney Foushee	Pond management	June
Summer Projects	Rodney Foushee	Planting millet	July
Summer Reminders	Rodney Foushee	Catch-and-release	Aug.
September Improvements	Rodney Foushee	Cleaning birdhouses	Sept.
Daylighting, Planting, Releasing	Rodney Foushee	Early succession	Oct.
Fall Housekeeping	Rodney Foushee	Backyard birding	Nov.

N.C. WILD STORE

Dazzling Butterflies

We've chosen a brilliant selection of rare and common butterfly species for our newest posters. Seventeen common butterflies and 19 rare species, in all their radiant color, adorn the posters. Range maps depict where each butterfly is found, and informational text highlights the connections between the butterflies and their habitats.

COMMON NORTH CAROLINA BUTTERFLIES
What's the wing span of a Question Mark butterfly? Learn this and much more from this educational poster. 22" x 34". $8.
ITEM CODE P15

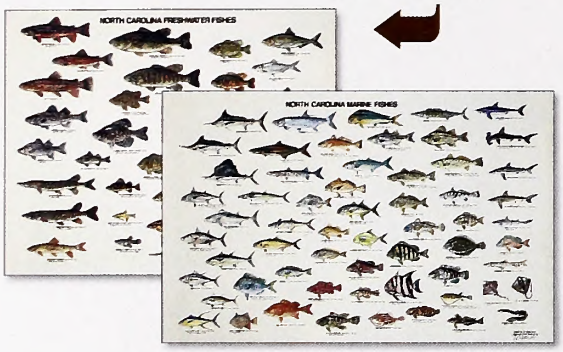
RARE NORTH CAROLINA BUTTERFLIES
Learn why these species are considered rare or endangered. 22" x 34". $8. ITEM CODE P16

BUTTERFLY POSTERS SET
Buy both posters and save! $14. ITEM CODE P17

All proceeds from the sale of these products support the development and production of conservation education projects and programs.

N.C. WILD STORE

North Carolina's freshwater fish and marine fish are colorfully displayed on individual posters, and feature the art of Duane Raver. Reel yours in today!



Fishes of North Carolina

Set of 2. Freshwater fish poster shows 36 state species (size 28" x 22½"). Marine fish poster shows 60 species (size 35" x 22½") $10.

ITEM CODE P9

Nature's Ways Collection

Explore the wonders of the natural world, wildlife species and ecosystems through "Nature's Ways." More than 200 essays from *Wildlife in North Carolina* have been compiled in a beautiful 6-volume paperback set. $27.50.

ITEM CODE M9

Also available as a boxed set. $30.

ITEM CODE M10

Before going on your next outdoor hike or camping trip, be sure you know North Carolina's reptiles.

Reptiles of North Carolina

Set of 4 posters in full color. Each poster decribes the species and denotes which reptiles are on the endangered, protected or special concern list. A set includes: lizards, turtles, and both live-bearing snakes and egg-laying snakes. Posters are sized 22" x 34". $18. ITEM CODE P10

Amphibians of North Carolina

The Hylid Frogs. North Carolina's tree frogs, cricket frogs and chorus frogs, belonging to the large family *Hylidae*, are presented in this colorful poster, one of two frog posters in the Amphibians series. 22" x 34". $6.

ITEM CODE P11

Amphibians of North Carolina

True Frogs and Toads. The second poster in the Amphibians series showcases true frogs and toads. Vibrant photos combine with informative text to make it a standout in the classroom or at home. 22" x 34". $6.

ITEM CODE P14

Waterfowl Decoys of N.C.

Nineteen classic waterfowl decoys from North Carolina's legendary days of waterfowl hunting have been collected for the first time on this framable, high-quality poster. This is the first in a series of "Sporting Heritage" posters. 22" x 34". $10.

ITEM CODE P12

Traditional Trout Flies of the Southern Appalachians

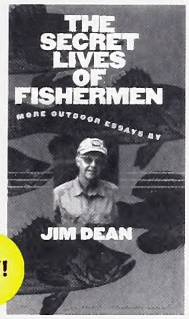
Sixteen traditional trout flies are presented in stunning color detail. Each fly is accompanied by a brief history of its development and use in Appalachian waters as well as the components that make up each hand-tied creation. Second in a series of "Sporting Heritage" posters. 22" x 34". $10. ITEM CODE P13

Bird Houses & Feeders: How to Build and Enjoy Them

An eight-page illustrated guide to building bird houses and feeders. $2.

ITEM CODE M6

The Secret Lives of Fishermen



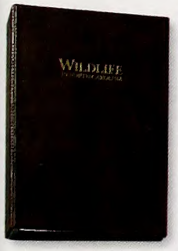
NEW!

In his second book of essays, Jim Dean has rounded up another varied and enjoyable collection of observations on fishing, hunting, the country life and days spent "poking around on freshwater rivers, lakes and ponds." Published by the University of North Carolina Press. Hardbound $24.95. ITEM CODE M13

NOW IN PAPERBACK!

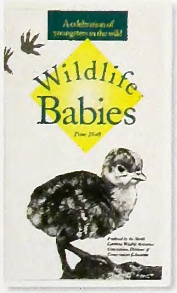
Dogs that Point, Fish that Bite

Here are some of the best "Our Natural Heritage" columns written by Jim Dean for *Wildlife in North Carolina* over the past 17 years. 220 pages. Hardbound $19.95. ITEM CODE M8
Paperback $10.95. ITEM CODE M12



Magazine Binder

Store 12 issues of *Wildlife in North Carolina* in a sturdy binder. $10. ITEM CODE M2



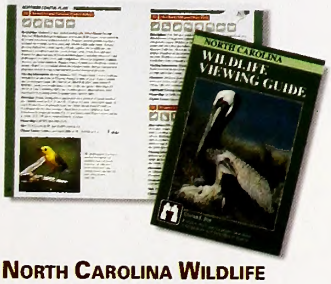
Wildlife Babies Video

Entertaining 25-minute video version of the classic 1965 Jack Dermid film reveals springtime antics of young wood ducks, black bear, possums, cottontails and others. $20. ITEM CODE N9

Based on Chief Seattle's 1855 speech, the film's focus is on environmental ethics. Accompanied by This Land Is Sacred, this film is a must-see for everyone. It is destined to become a classic.

All Things Are Connected

Video and Activity Guide. $22. ITEM CODE W3



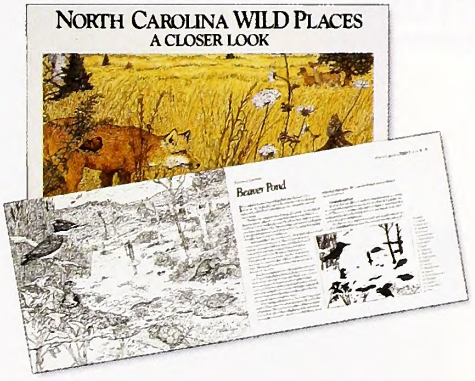
North Carolina Wildlife Viewing Guide

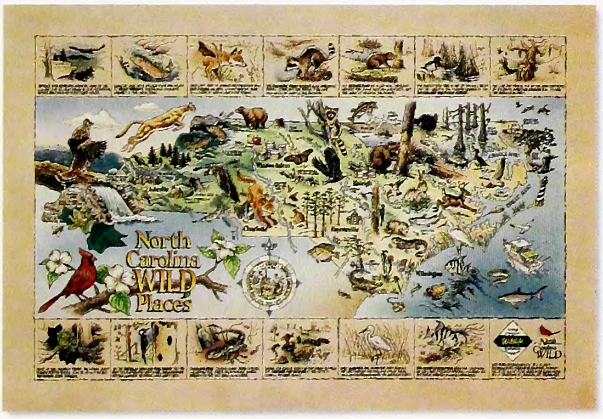
From Cape Hatteras to the Great Smokies, *North Carolina Wildlife Viewing Guide* will lead you to 90 of the state's premier wildlife viewing locations—and better your chances of seeing wildlife once you get there. $5.95. ITEM CODE N6

Scouting Correlations

Cub, Boy and Girl Scout requirements are correlated to Project WILD and Aquatic WILD activities. Supplements Scout leaders' planning materials and events. Each $3.
Cub & Boy Scout Correlation. ITEM CODE E9
Girl Scout Correlation. ITEM CODE E10

North Carolina's wildlife habitats come alive in this 82-page, easy-to-read, soft cover book. With delightful illustrations by Anne Marshall Runyon, N.C. WILD Places covers 13 habitats across the state.





North Carolina WILD Places: A Closer Look

Book and Posters Set. With each book you'll receive two habitat posters (also by Runyon) and a N.C. WILD Places Map poster, featuring the art of Jackie Pittman. $16. ITEM CODE E6

Gardens for Butterflies

Article reprint from *Wildlife in North Carolina* magazine for the gardener who wants to attract some of nature's most colorful creatures. $2. ITEM CODE M5

More terrific items ☛

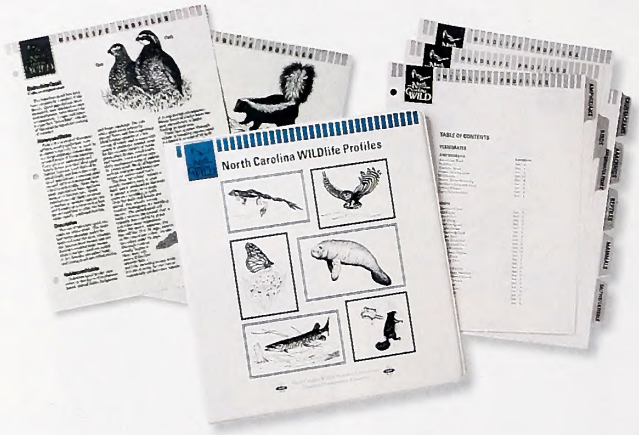
N.C. WILD STORE

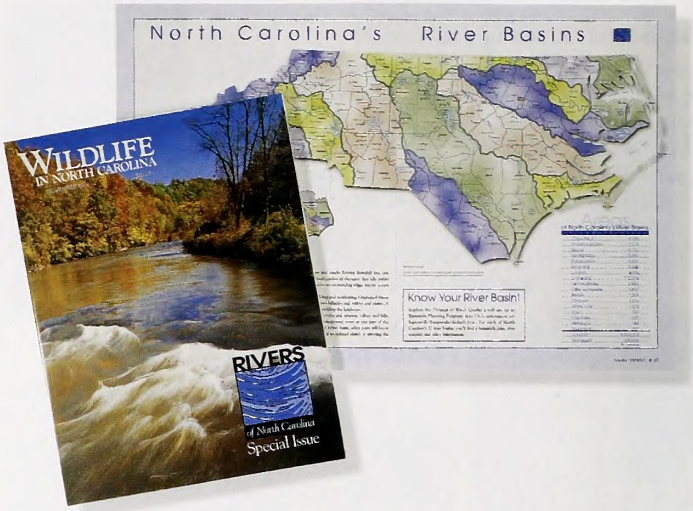
N.C. WILDLIFE PROFILES BINDER & N.C. WILDLIFE PROFILES SETS 1-12

This top-quality 3-ring binder includes:

- 120 illustrated fact sheets, each profiling an animal's history, status, habitat and behavior, and also containing a range map.
- Tab dividers that organize 12 sets of wildlife fact sheets by class.
- A table of contents, index and instruction sheet.

$30. ITEM CODE W17





RIVERS OF NORTH CAROLINA

This 128-page special issue of *Wildlife in North Carolina* examines issues relating to North Carolina's rivers, from canoe trips to water-quality to the real-life stories of people working to save our rivers.

For timely coverage of all of North Carolina's river basins, as well as eye-catching photos and educational maps and graphics, there's nothing else like it on bookshelves anywhere. Order "Rivers of North Carolina" for your own bookshelf, or give it to friends and family members to enjoy. For $10, plus shipping and postage, you'll have a coffee-table edition that's already being hailed as a classic. $10. ITEM CODE M11

EMBROIDERED CAPS

A1

A10

A11

A3

A7

A6

N.C. WILD Caps. N.C. WILD cardinal on two-tone, brushed-cotton twill cap with a Velcro® closure. $16.50 each.

- Tan cap with forest green bill. ITEM CODE A1
- Tan cap with burgundy bill. ITEM CODE A10

Wildlife in North Carolina Caps. Exclusive designs and magazine logo are featured on four different cap styles. $16.50 each.

- Deer silhouette on 6-panel, solid back cap. Advantage® Camouflage on cap and bill with plastic snap. ITEM CODE A11
- Brook trout on sage-colored, brushed cotton cap with an unstructured front, extended bill, and nubuck suede closure. ITEM CODE A3
- Deer silhouette on blaze orange cap with brown waxcloth bill. ITEM CODE A7
- Deer silhouette on Advantage® Camouflage cotton cap with tan suede bill. ITEM CODE A6

PISGAH CENTER FOR WILDLIFE EDUCATION T-SHIRT

100% cotton natural color tee with design on back and Pisgah logo on front. $14.50.
ITEM CODES:
A8MED (medium)
A8LRG (large)
A8XLG (extra large)
A8XXL (extra extra large)

WEE TEES

Just like the adult shirt with Pisgah design, only smaller.
ITEM CODES:
A9XS (extra small; size 2-4) $10.
A9SM (small; size 6-8) $12.50.
A9MD (medium; size 10-12) $12.50.
A9LG (large; size 14-16) $12.50.

WILDLIFE IN N.C. T-SHIRT

WINC magazine logo on front pocket. Tundra swan art on back. White.
$14.50. ITEM CODES:
A5MED (medium)
A5LRG (large)
A5XLG (extra large)
A5XXL (extra extra large)

N.C. WILD T-SHIRT

N.C. WILD logo printed on front and colorful art on back. White.
$14.50. ITEM CODES:
A4MED (medium)
A4LRG (large) ☛ SOLD OUT
A4XLG (extra large)
A4XXL (extra extra large)

GEORGE HUMPHRIES

Season's Greetings

From the staff of

WILDLIFE
IN NORTH CAROLINA

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Rough-hewn Treasures

These homely but historic roothead decoys represent an important chapter in the heritage of waterfowling along the Outer Banks. See page 4 for the story.

Periodicals

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